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GAS BLAST FURNACES

AND

Heating Machines.

SIXTH EDITION.

AMERICAN GAS FURNACE COMPANY,

OF ELIZABETH, N. J.

**Address: 23 JOHN STREET,
NEW YORK.**



Descriptive Catalogue

GAS BLAST FURNACES

AND

Heating Machines.

SIXTH EDITION.

American Gas Furnace Company,

23 JOHN STREET, NEW YORK.

EUROPEAN AGENCIES:

LONDON:

Charles Churchill & Co., Limited,
9 to 15 Leonard St., E. C.

BERLIN:

Schuchardt & Schuette,
59 Spandauer St., C.

PARIS:

Hermann-Glaenger & Co.,
No. 1 Avenue de la Republique.

Fuel Gas Plants,

Gas Blast Furnaces,

Heating Machines

AND 

Positive Pressure Blowers

FOR INDUSTRIAL PURPOSES,

EXCLUSIVELY.



*"I consider it positively barbarous to use
"coal for any purpose in its crude state, and
"believe the time will come when all crude
"Fuel will be separated into its component
"parts before it reaches our habitations."*

CH. W. SIEMENS.

OUR BUSINESS IS
TO PRODUCE **HEAT** ECONOMICALLY

in the shape, form, and manner best suited

TO EACH OF THE MANY KINDS OF HEATING

*required in the Mechanical, Metallurgical
and Chemical Industries,*

BY THE USE OF **GAS** AS FUEL
EXCLUSIVELY.

E. P. REICHHELM,
GEORGE MACHLET.



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Important Information.

- a. **GAS BLAST FURNACES** and **HEATING MACHINES** are made to secure the highest possible efficiency in the use of heat for Mechanical purposes and in the processes of Metallurgy and Chemistry.
- b. **"Gas Blast Furnaces"** are designed for the economical use of **Gas as Fuel** in Forges, Crucible Furnaces, Annealing, Enameling and Case Hardening Ovens, Assaying, Cupelling, and other Muffle Furnaces, Japanning Ovens, and Drying and Baking Kilns, in all of which the heat is generated by a properly proportioned mixture of Gas and Air, injected under positive pressure, through burners specially adapted to each of the different kinds of Gas in common use. The same principles are applied in
- c. **Blow Pipes and Burners** for Glass blowing, Brazing-Soldering and Laboratory work.
- d. **Heating Machines** are "Modern Machine Tools," made for special heating processes. They are combinations of Gas Furnaces with Moving Machinery for the automatic feeding and discharge of work which is to be annealed, hardened, tempered or forged **in quantities**.
- e. **The Chief Advantages** derived from the use of gas as fuel are the perfect adjustment of temperatures to exact requirements, which is impossible with either solid or liquid fuel the ease with which any desired degree of heat can be obtained by the simple adjustment of two valves, the uniformity of its distribution within given space, the partial or complete absence of oxidation, and generally, the perfectly uniform conditions under which any heating process can be performed irrespective of the quantities of work to be treated.
- f. **This Sixth Edition** of our catalogue illustrates many new heating devices, all of which are in practical and satisfactory use, and which we hope will commend our system anew to manufacturers whose product requires the correct heating of work in quantities.

- c. **The Gas Consumption**, or "cost of gas as compared with other fuel," while an important factor in determining the adoption of our system for the cruder operations of melting and forging, scarcely deserves consideration with reference to Furnaces or Heating machines for Hardening, Tempering or Annealing larger quantities of work because **no approximately equal amount of perfect work** can be produced by the use of any other fuel than gas.
- d. **The positive air blast** under pressure of about one pound to the square inch is indispensable to our system. No "Fan Blower" can therefore be used in connection with any of our furnaces.
- e. **Our High Pressure Blowers** supply the required volume and pressure of air at the least possible expenditure of power, and are described in a separate pamphlet.
- f. We will be pleased to estimate on special furnaces and heating devices for any purpose, and on **Complete Factory Outfits** including **Automatic Gas Generators** described in our pamphlet "The Fuel Gas System of the American Gas Furnace Co."
- g. **Experiments** to determine the applicability of our System in any new line of work will be made at our own expense.
- h. **To avoid misunderstanding**, we beg leave to say that we do not make Furnaces or Burners for either Coal, Crude Oil, or any other Fuel than Gas, nor can any of them be properly operated without **Positive Air Blast**.

Gas Blast Forges.

GAS BLAST FORGES heat work quickly, uniformly, and with little or no scale. They are always ready for use and develop the required amount of heat in a few minutes. They are used in machine shops for tool dressing and forging; in the production of quantities of small forgings such as cutlery, and for drop forging generally.

While offering decided advantages no single Gas Forge or Furnace can "replace the ordinary Coal Forge" in everything, because to be thoroughly effective as well as economical in gas consumption, the gas forge must be made for a definite range of work, and its heating space limited so as to conform to it in size and shape, with only fair allowance for clearance space.

In order to determine the applicability of any of the various styles of gas forges illustrated, the dimensions of the entrance, height, width, depth, and length of the heating chamber must be noted, and a fair allowance made for clearance. When samples of the work to be done are furnished us, together with a statement of the quantities to be heated in any given time, we will design special forges, warranted thoroughly efficient with a minimum gas consumption, and the price will approximate that of a regular size.

In Forging, the overheating of stock is totally prevented, a non-oxidizing atmosphere reduces the scale to a minimum, and properly heated stock is supplied as quickly as it can be handled.

Welding Forges should in all cases be especially designed for a particular kind of work, so that the blast is confined closely to the joint to be made. In welding tires, the diameter, width and thickness will determine the shape of the entrance to the forge and conform to it. Where the work is such that we can recommend their adoption, the advantages over Coal Forges far out-weigh any possible difference in fuel cost, and where used in connection with cheap fuel gas, such as **Naphtha Gas** produced by the American Oil Gas Machine, the fuel cost is less than Coal, while the productive capacity of the operator is greatly increased.

Gas Forges.



Gas Forge No. 1.

Price \$35.00

Entrance 3 inches wide by 2 inches high.

Depth of heating space. 4 inches.

Floor space: 20 x 24 inches.

Weight, packed, about 275 pounds.



Gas Forge No. 2.

Price \$50.00

Entrance 6 inches wide by 3 inches high.

Depth of heating space: 6 inches.

Floor space: 20 x 24 inches.

Weight, packed, about 400 pounds.

Gas Forges.

GAS FORGES, Nos. 1 and 2, are a type commonly used for dressing and hardening tools and smaller forgings. The Heating Chamber is circular inside, and its capacity is limited to the size of the Entrance to the Heating Chamber, and a corresponding opening in the back is ordinarily closed by a plug, which can be removed when a clear passage through the furnace is required. Two burners project into the Heating Chamber from the distributing pipe D W, so adjusted that direct contact of the flames with the work is avoided. Perfect combustion is steadily maintained, the work is quickly and evenly heated and oxidation reduced to a minimum.

The furnace is connected with air by a tin pipe at B, and the cock A controls the air supply. Gas connects with a union from the nearest supply pipe by $\frac{3}{4}$ inch pipe at P, and globe valve G controls the gas supply. The small cock C feeds a "Pilot Light" in the mouth of the furnace, which is left burning so as to instantly light the Forge when main supply is turned on.

The bottom of the Furnace can be cleaned of scalings by removing a plug which is held in place by the set screw I, which passes through the hanger K.

The Air Relief Valve R is a test valve to show the air pressure at the furnace, and when this has found sufficient it can be weighted down tight.

These Forges are made to work with **any kind of Gas** specified in order.

Gas consumption per hour; No. 1, about 50 cubic feet.

No. 2, " 80 " "

Gas Forges.



Gas Forge No. 3.

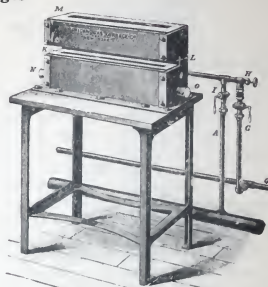
Price \$75.00

Floor space: 30 x 26 inches.

Heating space: 8 inches wide, 10 inches deep

Entrance: 8 x 3 inches.

Weight, packed, about 585 pounds.



Gas Forge No. 4.

Price \$85.00

Heating space: 3 inches deep, 15 inches long.

Floor space: 28 x 20 inches.

Weight, packed, about 340 pounds.

Gas Forges.

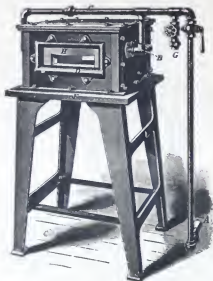
GAS FORGE No. 3. This style of Forge is especially recommended for drop forgings, to heat blanks continuously and keep them at the proper heat. The heating space is 10 inches deep, 8 inches wide and 3 inches high. The burners L penetrate the chamber from opposite sides and the flames do not strike the work direct. The blanks rest upon a fire brick bottom, which is removable from the rear for cleaning out the chamber. This Forge is extensively used in connection with oil gas, but can be adapted to every other kind, and dimensions varied as desired.

Gas Forge No. 4. This is one of the many types of forges made for special work, and can be varied in dimensions and arrangement to suit special purposes. It was made to heat small pieces of steel rapidly, to forge and to harden them. The pieces are placed in the slot K L. The heat is generated in the combustion chamber below from a burner inserted in the rear, and is sufficiently confined to come up evenly through the narrow slot in the lining. To relieve the operator from needless exposure to the heat it is drawn off through the flue M.

Made of any desired dimensions to order only.

Gas consumption per hour, No. 3, about 80 cubic feet.

No. 4, " 70 " "



Gas Forge No. 5.

Price, \$100.00

Floor space 36 x 26 inches,

Heating space 14 inches deep.

Entrance 11 x 3 inches.

Weight, packed, about 750 pounds.

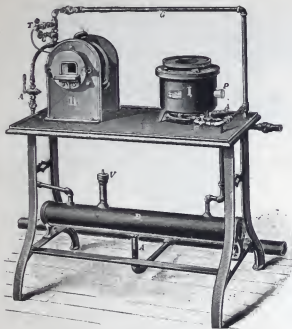
Gas Forge No. 5.

FOR DROP FORGINGS.

This Forge is especially designed for drop forging, but can be used for the general purposes for which the No. 3 is designed. Two rows of burners B penetrate the opposite sides, one above and the other below the entrance E, thus securing a rotation of flame around the work without direct contact.

The cast iron guard D is detachable for renewal.

*Gas consumption per hour,
about 120 cubic feet.*



Forge and Babbitt Melter on one Stand.

PRICES:

No. 1 Forge, - -	\$35.00	No. 2 Forge, - -	\$50.00
No. 1 Babbitt Melter,	10.00	No. 2 Babbitt Melter,	15.00
Stand and Connections, \$15.00			

Forge and Babbitt Melter.

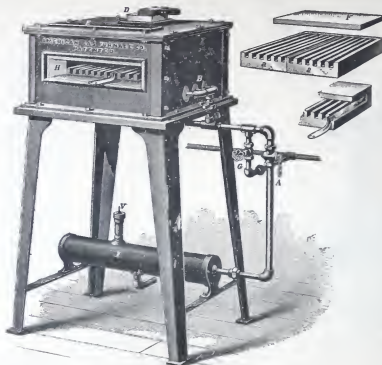
This is a convenient combination of Gas Forge and Babbitt Melter on one stand, and the combination can be made with either No. 1 or No. 2 Gas Forge and Babbitt Melter No. 1 or No. 2.

The cut shows a Gas Forge No. 1 and Babbitt Melter No. 2.

*Gas consumption per hour,
about 70 cubic feet.*

Table, 45 inches long by 22 inches wide
by 29 inches high.

Weight, packed, about 400 pounds.



Gas Forge No. 6.

FOR CUTLERY.

Gas consumption per hour, about 75 cubic feet.

Gas Forge No. 6.

FOR KNIFE AND SHEAR BLADES.

The construction of this furnace is similar to that of an oven furnace, but the fire brick slab upon which the work rests is ridged. These ridges form the partitions for the heating of each blade separately. The slab is as wide as the entrance, and does not extend to the rear, but leaves a narrow slot through which the heat is forced from under the slab upwards around the rear end of the slab and then forward in even volume to the vent E over the entrance.

In order to protect the points and thin ends of the blades, the corrugated slab may be covered as far as necessary by the fire brick slab F, and thus heated by conductivity rather than direct action of the flame, while the thicker portions of the blade are directly subjected to it. The difference in the time required to heat the thin and the heavier portions of the blade is thus approximately equalized, and the whole blade heated uniformly to the exact degree required.

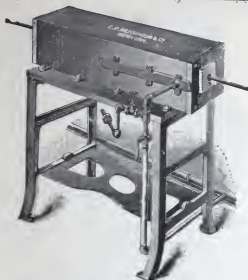
These furnaces are always made to order to suit the particular sizes of work to be done. This construction offers the great advantage of heating each blade without contact with another, and in the proper position evenly throughout, and by a proper adjustment of the gas and air by the valves G and A, a perfectly non-oxidizing atmosphere is maintained.

The cut represents a furnace made especially for shear blades from 8 to 12 inches long, and will accommodate 12 blades at a time, and will heat blades for forging or hardening as fast as they can be conveniently handled.

Floor Space: 38 x 25 inches.

Capacity: 12 blades not exceeding 12 inches in length.

Gross weight, with packing, about 1250 pounds.



Forge for Heating Iron Rods in Specified Time.

The cut shows a furnace first made for Messrs. B. ATHA & Co., of Newark, N. J., and the following letter explains its object.

BENJAMIN ATHA & CO.,
Manufacturers of Cast Steel,
NEWARK, N. J., June 14th, 1886.

MR. E. P. RICHMOND, N. Y.
DEAR SIR.—We gave you some months ago an order for a Gas Forge to heat 14 inch iron rods to a white heat at the rate of two feet per minute, while passing through continuously, and the requirements were fully met with in the furnace you made for us.
Yours truly,
BENJAMIN ATHA & CO.

We have since then made a great variety of Furnaces for continuous heating of Rods, Wire and Steel Bands in specified time, which are in successful operation, and we will estimate upon Forges or Furnaces for any operation requiring accurate heating in given time.

Note.—Experience has suggested changes in construction not shown in cut, which we use merely to call attention to this line of work.



The Rivet Heater.

Price, \$20.00

Available space for rivets: 7 inches round.

Gas consumed: 25 to 30 feet per hour.

The Rivet Heater is intended for larger shops where work is done by riveting machines, and it is desirable to keep the rivets at a uniform heat continuously.

The fire clay slab B, supported by an iron base A, is heated from above by the burner D. The gas supply by $\frac{3}{8}$ pipe is controlled by the valve G, and air by the cock F.

The Rivets are thrown upon the fire clay slab B, and are heated quickly and uniformly, and to any desired degree.

**Bench Forge No. 1.**

Price \$12.00

Bench space: 6 x 6 inches.

Weight, packed, about 30 lbs.

Bench Forge No. 1.

This is a handy little Gas Forge to be placed on the work bench, for forging and tempering small tools, heating the ends of rods or small pieces of metal of any kind. The heating space or chamber is $1\frac{1}{2}$ inches wide and high, and 3 inches deep, heated evenly throughout by two side burners whose focus is the center of the slot. Work can be placed over the slot and heated from below, or the slot can be covered by a slab shown in cut, and the heat confined to the chamber and raised to a very high degree quickly.

The Forge can be permanently connected with gas pipe and air supply, or by rubber hose to be movable.

Gas is supplied through a $\frac{1}{8}$ inch pipe, varies according to work done and quality of gas, and the consume is too small to be considered when its work is taken into account.

Gas consumption per hour, about 15 cubic feet.

**Bench Forge No. 2.****Price, \$25.00**

Bench space: 9 x 12 inches.

Weight, packed, about 85 pounds.

Bench Forge No. 2.

The cut represents a powerful Gas Forge, to be placed on work bench and can be used for a great variety of purposes, where the quick action of heat is needed. It was first made for brazing thick sheet brass by placing the joint in the center and resting the stock on the iron flanges projecting from each side. It is in use also for dressing tools, heating the ends of bars and rods, and when the two sides are closed by the fire brick forms a heating chamber $2\frac{1}{2}$ inches wide by 4 inches high and 6 inches deep heated by three burners, one from the **top** and one from each side of the **bottom**, with a powerful concentration in the center and **evenly** distributed through the whole length of the slot. It is especially useful in heating bars or strips in the center rapidly, with least possible radiation beyond the point to be heated.

*Gas consumption per hour,
about 40 cubic feet.*

Oven Furnaces.

FOR ANNEALING AND HARDENING.

THESE furnaces are designed to heat a square or oblong space of any desired dimensions, evenly throughout, to any required degree of heat from a cherry red to a white heat, and especially to maintain any required temperature steadily for any desired length of time. They will do the work of Muffle Furnaces perfectly except where an absolute seclusion of the work from the products of combustion is necessary. They are used for heating Cutters, Dies, Reamers, Shear Blades, Saws, and for annealing all kinds of metal work in quantities.

The annexed cut of Oven Furnace No. 1 is typical of all oven furnaces except dimensions and the shape of entrance.

Oven Furnace No. 1 has an inside space available for work 18 inches deep, 16 inches wide and 8 inches high. The entrance closed by the door E, is 12 inches wide and 6 inches high. The fire brick slab S separates the interior of the Oven into two distinct chambers, the Combustion Chamber under the slab and the Heating Chamber above it.

The slab S covers the full length of the Heating Chamber from front to rear, and is supported by small angle bricks located between the burners so as not to obstruct them. The width of the slab is less than that of the interior of the chamber, so that a slot is formed between the edges of the slab and the side walls of even width throughout. The burners C, bolted to the distributing channel R, are transposed with reference to the opposite series of burners, and arranged so that the injected flames pass one another in opposite directions alternately. The injection of the Fuel under pressure forces the heat through the slots on each side of the slab S, into the heating chamber above it, in even volume, and when the Combustion Chamber under the slab S has been heated up, the heat rapidly accumulates in the Heating Chamber. The products of combustion are released by the vent-holes V, which, being in the center, draw the heat upward from both sides, thus thoroughly heating the roof of the oven, from which the heat is reflected downward.

By the proportionate arrangement of all parts of the construction the heating chamber is evenly heated, and a block of steel placed as shown in the cut, will be heated up with perfect evenness simultaneously from all sides. The vestibuled entrance materially lessens the cooling off effect produced by opening the door E.

The gas supply and the burners can be readily adjusted so that no flame whatever will be visible in the heating chamber, but as this would conduce to oxidation, the proper proportion of gas is indicated when a very small blue flame issues from the vent V after the furnace has become thoroughly heated. For all metal work the atmosphere in the heating chamber should be just visible by a "flimmering" effect, which indicates a non-oxidizing atmosphere.

The advantages of an Oven Furnace over a "Muffle" consists in the more immediate and direct action of the heat upon the work, the lessened running expense by dispensing with costly and perishable muffles, and the adaptability of this furnace to very much larger work.

Oven Furnaces.



Oven Furnace No. 1.

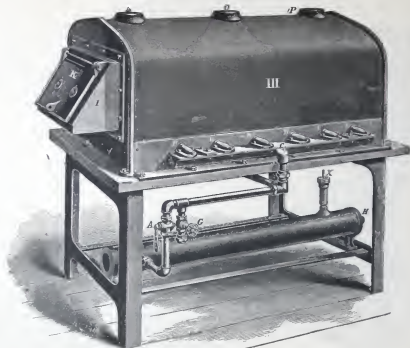
FOR HARDENING AND ANNEALING.

Price, \$150.00

Dimensions and Price List.

No.	Heating Space.		Size of Entrance.		Price.	Estimated Gas Consumption per hour. cubic feet.	Floor Space. inches.	Weight. Packed. About.
	Deep.	Wide.	Wide.	High.				
1	18 x 16		12 x 6		\$150.00	130	36 x 34	1500 LBS.
2	27 x 20		18 x 4		225.00	175	42 x 35	1900 "
3	18 x 10		8 x 6		110.00	100	28 x 24	1200 "
4	24 x 18		14 x 8		175.00	200	36 x 32	2100 "
5	45 x 21		18 x 8		250.00	350	58 x 36	3000 "
5	48 x 24		20 x 12		300.00	400	66 x 40	4000 "
7	29 x 24		20 x 6		235.00	250	47 x 40	2500 "
8	24 x 24		20 x 6		225.00	225	42 x 40	2000 "
9	28 x 23		20 x 10		250.00	300	40 x 39	2800 "
10	26 x 24		22 x 8		250.00	250	42 x 40	2300 "
11	20 x 30		26 x 7		250.00	250	46 x 34	2200 "
12	36 x 30		26 x 7		300.00	300	50 x 46	3000 "
13	27 x 20		18 x 8		225.00	250	42 x 35	2100 "
14	30 x 23		18 x 8		235.00	275	47 x 40	2400 "
15	60 x 26		24 x 12		450.00	475	74 x 44	4500 "
15	13 x 8		8 x 4		60.00	90	30 x 28	500 "
17	9 x 5		5 x 4		50.00	60	24 x 24	450 "
18	38 x 24		*20 x 12		285.00	325	52 x 40	3300 "
19	30 x 24		*22 x 12		275.00	300	47 x 40	3100 "
20	48 x 26		*24 x 8		375.00	350	64 x 40	3100 "

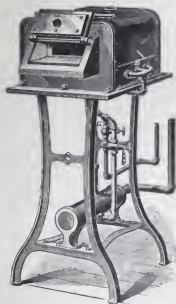
*With Sliding Door

AMERICAN GAS FURNACE COMPANY.**Oven Furnace.****Oven Furnace No. 5.**

FOR ANNEALING AND HARDENING.

Price. \$250.00.

Oven Furnaces.



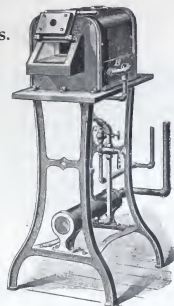
Oven Furnace No. 16.

Price, \$60.00

This furnace is well adapted for hardening cones, bearings, cutters and tools generally, and annealing steel, etc. The available space, which is evenly heated to any required degree, is 13 in. deep, 8 in. wide.

Entrance: 8 in. wide by 4 in. high.

Floor space: 30 x 26 inches.



Oven Furnace No. 17.

Price, \$50.00

Floor space: 24 x 24 inches.

Interior heating space available for work: 5 x 9 inches,

Entrance: 5 x 4½ inches.

Case Hardening Furnaces.

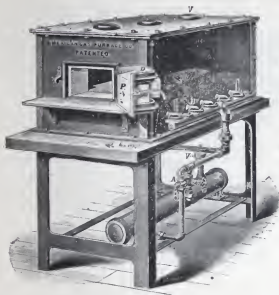
CASE HARDENING FURNACES are Oven Furnaces in construction, but being intended for work requiring the continuous application of higher heat, the linings are much heavier, and the entrance is closed by solid fire brick plugs P, which are inserted and withdrawn by the cast iron carriers D. As their name indicates they are mainly used for the process of case-hardening in cast iron boxes, but also for annealing heavy Steel Dies, Hubs, Tool Steel, etc. The slab which divides the combustion chamber from the heating chamber is heavier than in oven furnaces, properly supported by brick work to bear heavy weights, and cast iron rails are placed over the slab on which the boxes are moved in and out.

The burners B cover the whole length of the heating space; the opposite burners are connected to one gas and one air valve, which control the supply. The door plug P is of the exact size and thickness of the entrance, so that it can be easily inserted or removed by cast iron skeleton door D.

The advantages of Gas Blast Case Hardening Furnaces are that they do work more quickly and thoroughly than in the best of coal ovens in use, because from the beginning of the operation, **all** the boxes inserted—and all parts of each box—are heated simultaneously and alike, and that the heat can be kept constant at the maximum degree which the cast iron boxes will stand. These advantages shorten the process materially, and when once the time required for a given amount and kind of work has been ascertained, the same result can be reproduced thereafter, in the same time.

These furnaces have been in use for several years, and have been found satisfactory and economical, even when run with costly city gas. They are used by the Engraving Department of the United States Mint, at Phila., Pa., for annealing Die Blanks, and for Hardening Dies; by the S. S. White Dental Mfg. Co., for annealing Forcep Stock and Blanks and other work, and by many manufacturers of Bicycle Chains for Case Hardening Chain Blocks and Link Pins, and for a great variety of work including Steel Plates for Engravers, Bicycle Parts, Steel Rods, Rollers, etc., and various Tools and Implements made from lower grades of steel.

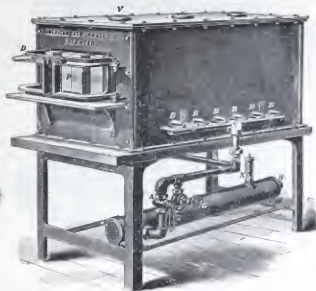
Case Hardening Furnaces.



Case Hardening Furnace No. 1.

Price, \$ 150.00

Floor space: 29 x 40 inches.

Heating space: $10\frac{1}{2} \times 19\frac{1}{2}$ inches.Entrance: $8\frac{1}{4} \times 6\frac{3}{4}$ inches.

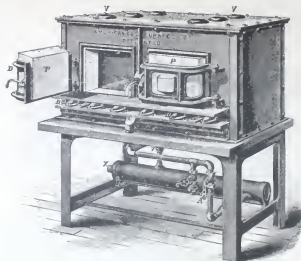
Case Hardening Furnace No. 4

Price, \$325.00

Floor space: 40 x 66 inches.

Heating space: 21 x 46 inches.

Entrance: 18 x 8 inches.



Case Hardening Furnace No. 3.

Price, \$290.00

Floor space: 47 x 39 inches.

Heating space: 26 x 16 inches.

Entrance: Each, $11\frac{1}{4}$ x 10 inches.

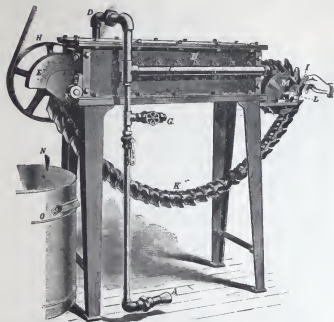
Case Hardening Furnaces.

Dimensions and Prices.

No.	Heating Space.	Size of Entrance.	PRICE.	Estimated Gas Consumption per hour, Cubic feet.	Floor Space	Weight, Packed, Approx.
1	10½ x 19½	8½ x 6½	\$150.00	150	29 x 40	1950 LBS.
2	10½ x 38	8½ x 6½	175.00	200	29 x 60	2600 "
2½	14 x 38	12 x 9	200.00	250	33 x 60	2750 "
3	26 x 16	11¼ x 10	250.00	250	47 x 39	3100 "
4	21 x 46	18 x 8	325.00	350	40 x 66	3600 "

Heating Machine No. 1.

FOR HARDENING THE EDGES OF MOWER BLADES.



Heating Machine No. 1. for Hardening Mower Blades.

Price, Machine as Illustrated,	\$250.00
" Speed Regulator,	40.00

Floor space: 64 x 20 inches.

Weight, packed, Heating Machine, about 950 pounds.

" " Speed Regulator, " 250 "

Gas consumption per hour, about 300 cubic feet.

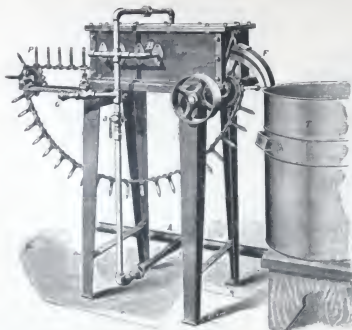
This machine was made for hardening the edges of mower blades, and will operate as fast as the blades can be dropped into the jaws of the link belt K at I. The jaws are so formed as to expose only the edge of the blade so far as it is to be hardened, to the action of the heat, while the body of the blade is protected by the shape of the jaws as they close upon the blade before entering the heating chamber.

The speed of delivery is regulated by a countershaft with friction cone, placed above the machine and connected with the driving pulley H. The burners B emit a short focus flame from both sides and are under the perfect control of the gas valve G, and the air valve A. The jaws of the link belt open as they pass over the center of the sprocket at I, where the blades are inserted, closing just as they enter the furnace, and the blades pass through the heating space at the proper speed, first ascertained by a few pilot blanks run through the furnace, and are dropped into the cooling bath from the mouth E, at the exact heat required for hardening the cutting edges.

The gas connects at union G, and air, under a pressure of at least 1 lb. to the square inch, at A. Where the machine is to be used on one uniform kind of blade, the proper speed may be experimentally obtained, and the friction cone countershaft dispensed with. Where the blades differ in thickness or size, a friction cone is indispensable.

The Cooling Bath O is not a part of the machine, but must be provided by the purchaser, and so arranged that the bath is cooled as rapidly as required for the number of blades heated.

For description of Speed Regulator, see page 296.



Heating Machine No. 2.

Price, Heating Machine,	\$125.00
Price, Speed Regulator,	40.00

Floor space 70 x 20 inches.

Weight packed, about 775 lbs.

Gas consumption per hour, about 175 cubic feet.

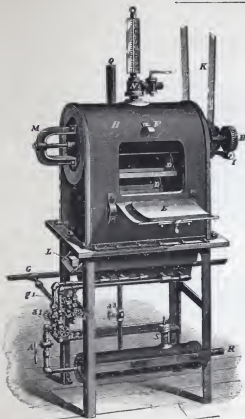
Heating Machine No. 2.

FOR HARDENING CONES AND SHELLS.

This furnace is used for hardening cones, shells, pinions and similar small work, which can be stuck on the pins which are inserted in the links of the endless chain. The work passes through the evenly heated furnace at a properly regulated speed and is discharged from the mouth F, as fast as it is fed, dropping into the bath T, without needless exposure to the air. The heat is under absolute control and the speed of the chain is adjusted to it so as to impart the exact temperature to the work required for proper hardening. When constantly used for the same work the proper speed of the chain is ascertained experimentally by turning the pulley by hand and then speeding the machine accordingly. When used for a variety of work a countershaft with friction cone pulleys is needed. The tank T is not included in the price of the furnace.

For description of Speed Regulator, see page 296.

Heating Machine No. 3, with Revolving Trays.



Heating Machine No. 3, with Revolving Trays.

Price, \$200.00

Floor space: 44 x 22 ins. Weight packed, about 740 lbs.

This furnace is designed for tempering Needles, small Blades, Springs and Screws. Its action depends upon heated air, with temperature so regulated that articles of irregular shape can be exposed to it long enough to impart the correct color or temper to the **heaviest section**, without overheating the thinnest and lightest part of the same piece. This is accomplished by regulation of the burner, which is usually divided into three sections, each under separate control. By these means the injection of the heat **evenly** throughout the furnace is easily secured, and the overheating of either end or the center is prevented. The burners heat an air chamber connected with the air drum by the pipe and valve A 3, and heated air is distributed in the Heating Chamber through perforations in the top of the air chamber under light pressure, relieved through the vent cock at N. The work is placed in the pans D D, which rotate at a speed of twice or thrice per minute, hanging loosely from rods connected with spokes around the driving shaft in the center, which receives motion from the worm gear I H, connected with power. The door E is closed when furnace is charged with work, and opened for its observation. When open, the door forms a shelf or rest for the pans. The thermometer indicates a degree of temperature somewhat different from the actual heat in the furnace. Once tried for a certain temper or color, it is a perfect **gudge** for repeating the same result.

Gas consumption per hour, about 60 cubic feet.

Heating Machine No. 4.

THIS style of Heating Machine is designed for heating large quantities of small steel work of uniform size and weight, evenly and uniformly, to any required degree for hardening, or for annealing the same, automatically. The work is placed on the cast iron link belt C 1, which revolves entirely within the heating chamber N, except where momentarily exposed at entrance M, to receive the work. The burners B penetrate from each side of the furnace above the link belt, and are perfectly controlled by the gas valve G, and the air valve A.

The belt is supported by sprockets in the heating chamber, whose shafts revolve on the rolls D. The belt is moved at required speed by means of a friction cone which is placed above the machine and connects with the driving sprocket F, by the chains H H.

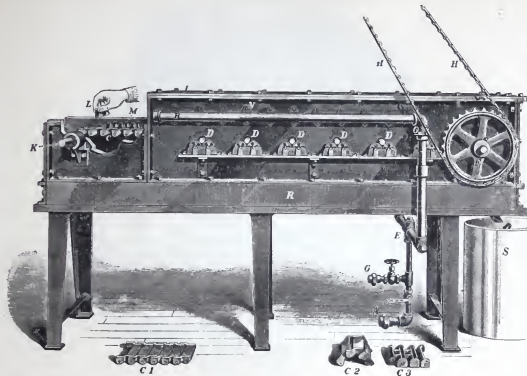
The weight and size of the work, and the degree of heat which it requires, determines the speed at which the belt is moved, and consequently the output. The temperature of the heating chamber and the speed of the belt being under perfect control, the output is only limited by the time it takes to heat the work to the exact degree required. The output of the machine, of which the cut opposite is an exact representation, is over 1,000 gross of small, thin, steel articles per hour. We omit to mention this particular work at the request of our customers for whom it was originally made.

The cooling bath S is not a part of the machine, but is shown merely to illustrate the whole operation. A proper cooling bath is important. It should be of ample size, and so arranged as to promptly cool the work without varying materially the temperature of the oil. We will be pleased to suggest the proper arrangement in each case. Gas connection is made to the union G, and an air blast from a **positive pressure blower** connects at A.

We recommend this furnace for any kind of work of which large quantities of a uniform character are to be hardened or annealed. We will vary dimensions of heating chamber and construct link belts according to requirements. Samples of the work to be done should be sent us with orders, or request for estimates.

The Machine represented in cut contains a link belt which will carry any kind of work covering a square space of 5 x 4 inches, made of stock not over $\frac{1}{8}$ inch in thickness.

For description of Speed Regulator, see page 296.

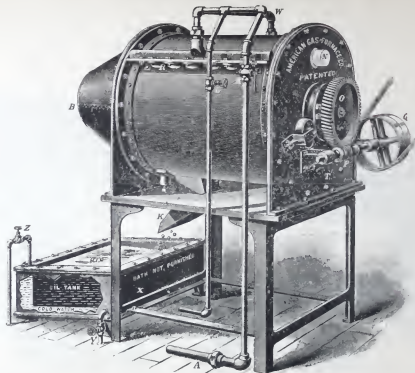


Heating Machine No. 4.

Price, \$650.00, Speed Regulator Included.

Floor space: 8 ft. 3 in. x 30 in. Weight, packed, about 3,000 lbs.

Gas consumption per hour, about 200 cubic ft



Floor space.
74 x 48 ins.

Weight, packed,
about 3,200
pounds.

Gas consumption
per hour,
about 300
cubic feet.

Heating Machine No. 5.

Price, \$600.00, Speed Regulator included.

Heating Machine No. 5.

FOR HARDENING BALLS, SAW TEETH, SCREWS, ETC.

THIS machine was originally designed for hardening quantities of **Bicycle Balls**, but has since been made for hardening detachable **Saw Teeth, Pens, Nuts, Bolts, Screws**, and other work not exceeding two and one half inches **in any dimension**.

Steel work of any shape is evenly and thoroughly heated to the exact degree required, regardless of its shape, the thinnest and thickest parts being discharged at exactly the same temperature.

The machine is capable of heating from 1500 to 2000 lbs. of steel work per day, the rate of delivery depending upon weight and shape of the pieces.

The cooling bath marked X in the cut is merely a suggestion and is **not furnished** with the machine, because its size depends upon the work to be done, as well as upon the available water supply for cooling. Its size and construction also depends upon the temperature of the water to be used, and will vary under different circumstances.

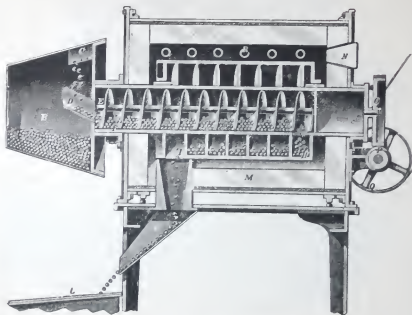
Different methods are employed to cool oil baths. One is to draw the hot oil from the top, running it through pipes immersed in cold water, and pumping it back to the bottom of the tank cooled. Another is as illustrated. The tank holding the oil is shallow and water jacketed, the water being circulated at the rate required to keep the bath at proper temperature, determined by reference to a thermometer.

Where the water supply itself is not sufficiently cool, the bath may require cooling by ice, or the operation of the furnace may have to be limited to the capacity of the bath.

In several instances the machine has heated work faster than it could be cooled, and the possible output therefore greatly depends upon the bath.

For description of Machine, see following page

For description of Speed Regulator, see page 296.



Longitudinal Section through Center of Heating Machine No. 5.

Heating Machine No. 5.

CONSTRUCTION AND OPERATION.

THE cylindrical body of the machine heavily lined with fire brick encloses a solid cast iron cylinder with a spiral way, $2\frac{3}{4}$ inches to 3 inches wide. The shaft of this "Spiral Way Cylinder" is a heavy wrought iron pipe containing the wrought iron spiral E. This hollow shaft and the cast iron spiral cylinder revolve together. The heat is generated over the drum and is evenly distributed from both sides by the burners R. The products of combustion are allowed to enter the spiral drum, thus excluding atmospheric air from it to prevent oxidation, and find their vent through the bottom of the furnace by being forced through the discharge I.

The work being placed in the hopper B, which is kept filled to the level of the entrance, the scoop C, revolving with the cylinder, fills itself with work as it is rotated downward, and empties its contents into the stationary funnel D, when it rotates to a position above it. From this feeding funnel D the work drops into the spiral way E, and is propelled to the opposite end of the inner spiral, where it drops into the outer cast iron spiral way at H, in which it is propelled in the opposite direction and drops from the cylinder I to the chute K into the cooling bath L.

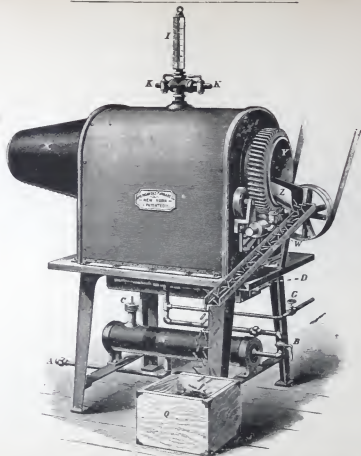
The stationary feeding funnel D, with the scoop C, the interior spiral E and the cast iron spiral drum I H, revolve together by action of the worm gear P O. The number of revolutions required to discharge the work at the proper heat are experimentally ascertained, and the rate of discharge being once established, the machine will turn out a perfectly uniform product.

The speed is regulated by a "friction cone" countershaft placed overhead, from which the power is transmitted to the pulleys Q.

The furnace is lighted by withdrawing the plug N and turning on the air full, inserting a torch, and then turning on just sufficient gas, so that the burners emit a perfectly blue flame. The gas and air supply valves A and G permit the heat to be regulated to exact requirements. The temperature of the drum can be observed by the removal of the lighting plug N, and by means of the friction cone the time required for heating and delivery is regulated with precision.

It will usually require from 45 minutes to one hour to heat the spiral ways for hardening. At the expiration of that time the machine will turn out the work at a regular rate. Where thin and thick work are put through the machine together, the time of delivery will be determined by the heaviest article put through, but the lightest or thinnest will not be overheated unless the temperature is allowed to increase beyond the highest degree required for hardening.

The main body of the machine is a solid fire clay cylinder enclosed by a heavy sheet iron casing. All bearings are ball or roller bearings, needing but little lubrication. Both heads of the machine can be removed for the insertion of a new cylinder when required, the body of the furnace resting independently upon the table, thus remaining in position if heads are detached. For description of Speed Regulator, see page 296.



Heating Machine No. 6, for Tempering and Coloring.

Price \$600.00, Speed Regulator included.

Floor space 74 x 48 inches. Weight, packed, about 1560 lbs. Gas consumption per hour, about 100 cubic feet.

Heating Machine No. 6.

FOR TEMPERING AND COLORING STEEL.

THIS is a machine for tempering and coloring steel work in quantities with perfect uniformity. The cut represents an improved type of machine which has been in satisfactory operation for several years, for tempering and coloring pens, bicycle chain link blocks, penholders, saw teeth, screws, buttons, and other similar work not over two inches in any dimension.

The operation is performed by subjecting the work to the action of sand or ground flint heated to the proper degree required for any grade of temper, and a bright, clean and perfectly uniform temper color is obtained when the work has been properly prepared for coloring by thorough cleansing.

The capacity of the machine depends upon the size and weight of the articles, but as a criterion for its efficiency we can say that bicycle chain blocks and insertable saw teeth have been put through at the rate of 150 lbs. per hour.

The work is placed in the hopper X, containing a small scoop, which at every revolution deposits a measured quantity into a funnel leading into the heating drum. This drum, contained in the main body of the machine, is provided with a spiral way which gradually propels the work to the discharge Z.

The spiral partitions are enclosed by a perforated cylinder, through which sand or flint heated to the proper temperature to obtain a desired temper or color is constantly sifted upon the work.

Provisions are made to keep a sufficient quantity of sand stored above the work, so as to secure its even distribution into all the spiral divisions of the drum, thus effecting its uniform action upon the work.

The outer casing of the drum is subjected to an evenly distributed heat, controlled by proper adjustment of the gas valve G and the air valve B.

The speed at which the work passes through the spiral drum is regulated by a friction cone placed above the machine, and the temperature by reference to the thermometer I.

By noting the temperature at which different colors are obtained at a given rate of delivery, the exact conditions of heat and speed under which any variation of color or temper is obtainable can be readily observed and the perfect uniformity of the output assured. This machine has given perfect satisfaction wherever placed.

For work of larger dimensions we will furnish estimates for machines conforming to requirements. For description of Speed Regulator, see page 296.

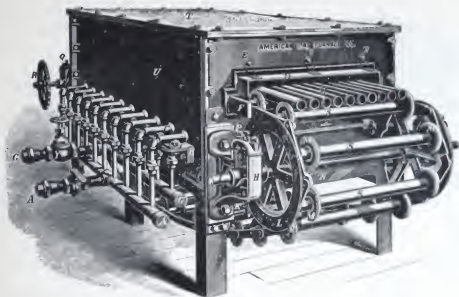
Heating Machine No. 7.

FOR ANNEALING STEEL TUBING OR SHAFTS.

THIS annealing machine for steel tubing was designed for the McCool Tube Co., of Beaver Falls, Pa., to operate with natural gas. After delivery of the first machine, three more were ordered during the past year with the injunction "to build the same exactly like the first in every particular."

The tubing is fed from the table provided with rolls which revolve at the same speed as those in the machine. Entering the heating space from the rear the tubing is propelled through it at the required speed, controlled by a friction cone countershaft overhead, which is belted to the sprocket wheel R. The rolls S revolve with the guide wheels M, which enter the furnace on guide rails protected from direct heat.

Roller bearings obviate the necessity for much lubrication, and liberal clearances provide against binding by expansion or contraction. The heat is evenly distributed and under perfect control of the valves W and Y. The whole machine is solidly built, portable, and thoroughly efficient, and parts subject to wear are easily replaced. The degree of heat for a perfect anneal is obtained in about thirty minutes, and by properly regulating the speed by the friction cone overhead, tubing of varying sizes can be passed through in rapid succession. Not one moment's time need be lost, and tubing of any size may be passed through the furnace as quickly as in the nature of things it can be thoroughly penetrated by the heat, and thus evenly and perfectly annealed.

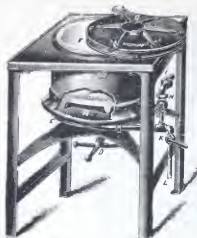


Heating Machine No. 7, for Annealing Steel Tubing.

Price \$700.00

Floor space: 10 ft. 9 in. x 60 in. Weight, packed, about 6000 lbs Gas consumption per hour, about 600 cubic feet.

Round Annealers.



Round Annealer No. 1.

For Wire, Plate and Light Stock Coiled.

Price \$75.00

Heating space: $10\frac{1}{2}$ inches diameter, 6 inches high.

Floor space: 20 x 20 inches.

Weight, packed, about 270 lbs.

Gas consumption per hour, about 50 cubic feet.

Round Annealer No. 2.

Price \$85.00

Heating space: $17\frac{1}{2}$ inches diameter, 6 inches high.

Floor space: 27 x 27 inches.

This style of Furnace is excellent for **Hardening large Round Dies, Discs and Heavy Rings.**

Larger sizes to order.

Weight, packed, about 480 lbs.

Gas consumption per hour, about 75 cubic feet.

Round Annealing Furnaces.

THESE Furnaces are principally used for annealing coils of wire or plate, but are also used for heating circular discs of steel, round dies and cutters for hardening.

Round Annealing Furnace No. 1 is a cylinder F, with heavy black lead lining, closed by a swinging cover G, and having an inside space available for work of 11 inches diameter by 6 inches depth. A double bottom or "Rest", C, which is raised about one inch above the bottom of the cylinder, divides it into two compartments, the lower one forming the combustion chamber. The flames are projected into the furnace from the circumference horizontally under the bottom C, and at an angle from the center, so as to create a rotary motion of the flames, and a perfectly even distribution of heat in the upper chamber. The furnace is intended to be in continuous operation, so that work can be annealed instantly by simply swinging back the cover G, placing the coil or annealing box on the bottom and replacing the cover. The work can be watched through the hole in center of cover. The heat is perfectly controllable by the gas and air valves, and the finest wire or heaviest gold plate is annealed evenly and thoroughly, without risk of melting or burning. Oxidation is prevented or reduced to a minimum. It is in use in all of the larger factories of Jewelry, Watch Cases, etc., and has been used for brass articles with much satisfaction.

Round Annealing Furnace No. 2 has an inside space 6 inches deep and $17\frac{1}{2}$ inches in diameter. It is the same in arrangement as No. 1, but the lining is heavy fire-clay instead of black lead. On account of its weight the cover is provided with a "Cover Lift," the same as applied to larger Melting Furnaces.

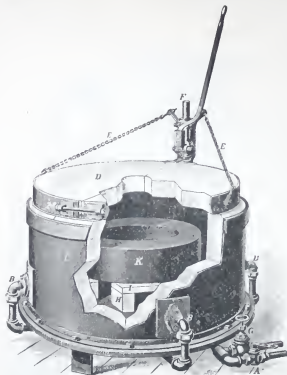
Circular Annealing and Hardening Furnace.

This furnace is designed for heating large rims, rings, discs, dies and other Circular Steel Blocks which do not exceed 30 inches in diameter and 10 inches in thickness.

The illustration shows a circular block K resting upon fire brick supports H, so placed that they do not in any way obstruct the flames emitted from the four burners B. The direction of the flame is tangential at the proper angle, to secure a rotary or whirling motion of the flame, and the even distribution of the heat, effecting the perfectly even heating of the work. This should be placed centrally, *i. e.*, evenly distant from the inner walls of the cylindrical casing.

The cover D is attached to the cover lift, and held by the adjustable chains E E. It is lifted by a toggle joint by pulling the lever handle inserted in the socket L forward, and easily swings to either side. To replace the fire brick cover, the clasp M on the sheet iron belt which tightly encloses it is unscrewed, and a new brick lining inserted. The valve G admits gas and connects with the gas supply. A connects with air supply.

Other sizes to order.



Circular Annealing and Hardening Furnace No. 3.

Price \$200.00

Floor space: 52 x 48 inches. Weight, packed, about 3500 lbs.

Gas consumption per hour, about 300 cubic feet.

**Bar Annealer Nos. 1 and 2.**

Price \$50.00—\$75.00

Floor space 27 x 27 inches.

	No. 1	No. 2	No. 3	
Weight, about	230,	280,	500	lbs.

Gas consumption	{	35, 50, 60 cu. ft.
per hour, about		

Bar Annealing Furnaces.

Bar Annealer No. 1 is extensively used by manufacturing Jewelers and Silversmiths for annealing stock until it is rolled down to a size where it can be coiled.

It is heated by numerous small jets, projected horizontally from burners on each side, which meet just above the center of the bottom slab, and produce an even heat throughout the length of the chamber. The burners are well protected by the side linings. The roller E in front and rear support the stock and keep it from scraping over the bottom. L is a separate gas jet, which is kept burning to light the furnace instantly, by turning on the main gas supply by the valve G. F is the air cock which controls the blast.

Dimensions: Working space 9 inches long, 4 inches wide, $3\frac{1}{4}$ inches high. Height of table 38 inches.

Bar Annealer No. 2 is substantially like No. 1 in construction and operation, but is intended for heavier work, especially Silver, and is in use in most of the large Watch Case Factories.

Dimensions: Working space 12 inches long, $4\frac{1}{2}$ inches wide, 4 inches high. Height of table 3 feet.

Bar Annealer No. 3 is substantially like above and of the following dimensions:

Working space 10 inches deep, $8\frac{1}{2}$ inches wide, $2\frac{3}{4}$ inches high. Height of table 38 inches. **Price \$75.00.**

Furnace for Annealing Steel Bars and Shafting.

THIS furnace was built for the Union Drawn Steel Co., of Beaver Falls, Pa., for annealing steel shafting. Its construction is the same as that of an oven furnace. The interior space is 7 feet in length, and the entrance 30 inches wide. The bars or shafting pass over the guide rollers N front and rear, and are supported in the center by the same rollers on the shaft E, which runs in roller bearings F.

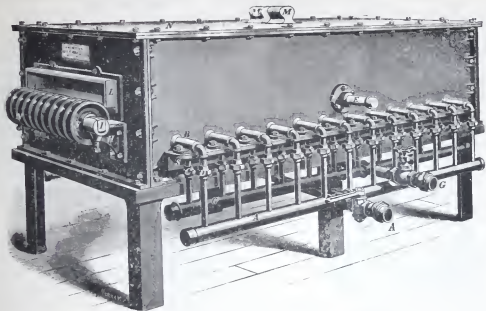
The central shaft is hollow and is cooled by the circulation of water. The work is easily passed through the furnace over these guide rolls M even distance apart. The purpose of this furnace is to continuously pass the work through the furnace to the draw bench for its reduction to proper size. In this case the work is done with natural gas, which connects with the valve G, and a large "Reichhelm" pressure blower furnishes the blast for several such furnaces, which are in entirely satisfactory operation.

Price \$600.00.

Entrance: 30 inches wide, 4 inches high in the clear.

Capacity: Ten $2\frac{1}{2}$ inch shafts.

Length of clear heating space 7 feet.



Furnace for Annealing Steel Bars and Shafting.

Price \$600.00

Floor space : 9 ft. 4 in. x 60 inches. Weight, packed, about 6000 lbs. Gas consumption per hour, about 500 cubic feet.

Oil Tempering Furnaces.

THESE furnaces are made for tempering steel work in oil or tallow, and have the advantage over similar apparatus heated by coal that the heat is evenly distributed and penetrates the bath from all sides, that the temperature is under perfect control, that no flame can escape from the combustion chamber to ignite the oil or fumes arising from it, and that the temperature of the oil can be raised to an exceptionally high degree without risk of flashing. They are made in shapes and sizes to suit, round, square or oblong.

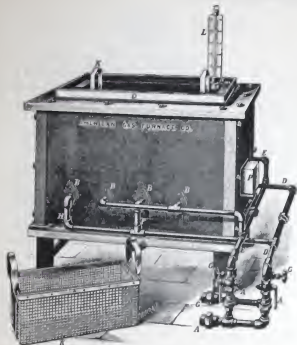
Furnace No. 30 has the burners B arranged in two separate sections of four, two on each side, each section being under separate control of the gas and air valves below the distributing pipes D and E respectively.

To heat up the bath, both sets of burners are turned on, and when the desired temperature is reached, as indicated by the thermometer L, one set of four burners can instantly be put out of use, so as to prevent the too rapid increase of the heat to the flash point.

The work is placed in the basket K, which may be filled to the top. The immersion of the work in the bath quickly reduces its temperature, and the work remains in the bath until the thermometer shows that the heat of the bath is restored to the proper degree. The best oil to be used is "BLACK TEMPERING OIL," generally supplied by the agencies of the Standard Oil Co., which can be raised to a temperature of 600° F., and will temper steel from straw color to a **light** blue. The basket K is 18 inches long, 10 inches wide, and 8 inches deep.

Oil Tempering Furnace No. 3. Its construction is similar to that of a soft metal furnace. The pot is 10½ inches in diameter, 10 inches deep, and the temperature is regulated by reference to the thermometer T held in place by the clamp K. The bulb of the thermometer extends below the middle of the bath, and the burners are arranged to distribute the heat with perfect evenness around the pot.

For small work a wire basket is used to contain the articles to be treated, while larger work is suspended in the bath in any convenient way. The temperature being under the perfect control of the gas and air valves G and A, the bath is heated until the thermometer shows the proper heat. When work is submerged in the bath it cools down, and the work remains there until the temperature rises again to the original degree, when the work is removed.



Oil Tempering Furnace No. 30.

Price \$150.00

Floor space 42 x 42 ins. Weight, packed, about 1400 lbs.
Pot: 23 inches long, 15 inches wide, 12 inches deep.
Basket: 18 inches long, 10 inches wide, 8 inches deep.

Gas consumption per hour, about 50 cubic feet.



Oil Tempering Furnace No. 3.

Price \$70.00.

Floor space 27 x 27 inches.
Capacity Pot, 10½ ins. diameter, 10 ins. deep.
Weight, packed, about 560 lbs.

Gas consumption per hour, about 30 cubic ft.



Melting Furnace No. 1.
"LITTLE GIANT."

Melting Furnace No. 1.

"LITTLE GIANT."

This is our smallest size of Melting Furnaces. It is used principally for small meltings of gold and silver and in laboratory work. The blast is supplied from a positive blower or a foot bellows, when power is not available.

The heating chamber consists of two parts: the "cylinder" D and "bottom" C. The "burner ring" B is inserted between C and D and protected from heat by a recess in both, which enclose and cover the burner ring.

The "bottom" rests upon a cast iron stand A, the iron frame H holds the cylinder D in position, and serves as a support for the cover E when displaced to insert the crucible, or to remove it. A and H are connected by the Bolts K, and when the wing nuts K are unscrewed, the furnace can be taken apart. G is the gas connection. All parts are interchangeable and can be easily replaced.

The air pressure being steadily maintained at one pound, with gas of 20 candle power, the furnace will melt 10 ounces copper in 10 minutes.

CAPACITY:

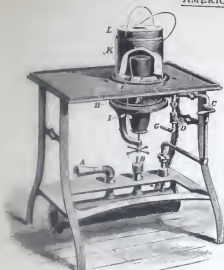
Black Lead Crucible, No. 4/0, $3\frac{1}{4}$ inch high.
Round Sand " 4 " "

Price of Foot Bellows, \$5.00

" Furnace, 12.00

Weight, packed, about 25 lbs.

Gas consumption per hour, about 20 cubic feet.

**Melting Furnace No. 2.**

Price \$50.00

Floor space 29 x 24 inches.

Height of table: 29 inches.

Gas consume 50 to 75 cubic ft. per hour.

Time of melting: 5 lbs. copper 10 min.

Weight, packed, about 250 lbs.

CAPACITY:Black Lead Crucible No. 5, 5 $\frac{3}{4}$ inches high.

Round and "Sixes," 6 " "

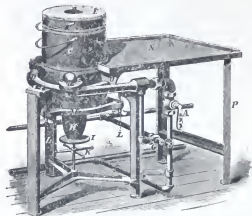
Melting Furnace No. 2.

This furnace is used principally for melting gold and silver by jewelry manufacturers, for assay work, and small melts of copper, brass, etc. It can be used only in connection with a pressure blower.

The furnace proper consists of three principal parts, the bottom F, the burner ring with burner tips E projecting into it, and the cylinder K, which rests upon the bottom F by its own weight. The bottom contains the rest or support upon which the crucible stands, which is slotted underneath so as to cover, but not obstruct, a passageway in the bottom to the crucible underneath, to receive leakage or overflow.

The burner ring is clamped to the table and incloses the bottom, the tips projecting into it through the slots E which are tightly fitted with fire clay putty so as to make a tight joint between the tips and the lining. The three tips are so directed that the flames do not strike the crucible but rotate around it in the space between the cylinder and crucible, and a most perfect combustion is secured before its products escape through the vent hole in the cover L.

All parts are detachable and easily replaced. The bottom drops down by unscrewing the wing nuts I, which pass through the platform H. The burner ring is held in position by three clamps secured to the table by bolts, shown on top and the drip cup or crucible is held by the set screw which passes through the arm. Blast pipe connects at A, gas $\frac{3}{8}$ inch pipe at G. B is the pressure relief valve.



Melting Furnaces Nos. 3 and 4.

Price \$75.00 \$90.00

Melting Furnaces Nos. 3 and 4.

These furnaces are used for all kinds of metals, as also for refining. The burner ring D is a perfectly solid casting permanently attached to the legs and only the burner tips are detachable. When burned out, these tips are easily replaced, by unscrewing the two bolts which pass through the tip flanges. The table shown in cut is independent from the furnace and is shoved in position to afford a rest for the crucible, ingot, tongues, etc.

Floor space required. Without table, 20 x 24 inches.

With " 20 x 34 "

CAPACITY:

No. 3.—Black Lead Crucible No. 8, 7 inches high.

Round Sand " Eighths, $7\frac{1}{2}$ " "

No. 4.—Black Lead " No. 10, 8 " "

Round Sand " Halves, 9 " "

Gas consume. 80 to 120 cubic feet per hour.

No. 3 will melt 10 lbs. copper in 25 minutes.

No. 4 " 20 " " 30 "

Weight, packed, about 275 lbs.

Melting Furnaces.

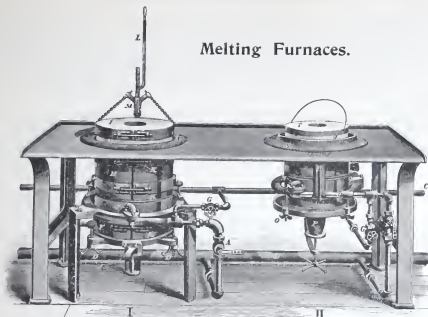


Table with two Melting Furnaces, Nos. 4½ and 3.

Price \$225.00

This cut shows the usual manner of mounting different melting furnaces in one table. This combination is a No. 4½ and No. 3 or 4 Melter. The table is 5½ feet long, 33 inches wide and 31 inches high from floor to table top. The top of each furnace is enclosed by a cast iron flange with raised edge, tapering inward and leaving a wide groove around the cylinder top, which is filled in with fire clay, any drippings in dipping out metal, or feeding it, will remain on the table.

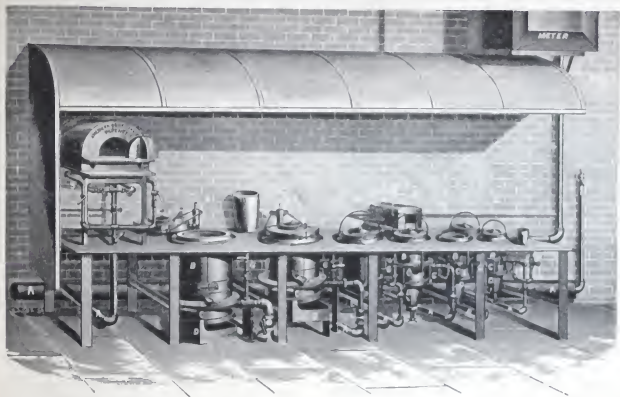
We make such tables for any combination of furnaces desired, from No. 1 to 8.

Bench of Gas Blast Furnaces

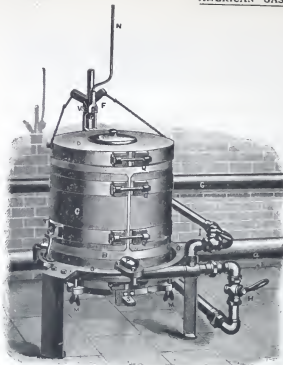
At the United States Assay Offices, New York.

THE annexed cut represents a bench of six melting furnaces, Nos. 2, 3, 4, 5, 6, and 7, and one assay cupel furnace with No. 5 muffle. They are in daily operation since March, 1888, and illustrate the manner of mounting and connecting any number of furnaces in compact shape within limited space. The square furnace under the white number 5 is a small bar annealer used for heating the stirring rods. The blower connects with main air supply A, and gas from meter to common supply pipe G. The reference letter B on each furnace stands for the cased **cylinder**, C for detachable bottom, and D for **drip crucible** to receive overflow; G indicates **gas** and A **air** supply valves. No. 9 is a cupelling or scorifying furnace with No. 5 muffle, and H is the air valve for the relief of surplus pressure.

We but repeat the expressions of the Superintendent and Melter and Refiner in saying "they give perfect satisfaction and do all you claim for them." Unable to obtain written testimonials from government officers, we have their kind permission to refer to them.



Bench of Furnaces at the U. S. Assay Office in New York City.



Large Crucible Furnaces.

Numbers.	4½.	5	6	7.	8.	9.
For Black Lead Crucible No. }	15.	20.	30.	40.	60.	100.
Floor space required }	30x24.	32x30.	32x30.	33x30.	33x30.	40x38 in.
Gas Supply Pipe	¾.	1.	1.	1¼.	1¼.	1½ "
Gas Consume per hour about }	150.	200.	240.	300.	360.	450 c. ft.
Weight, packed, about }	420.	600.	600.	660.	760.	1180 lbs.

NOTE:—The gas consume is estimated and varies according to heat required, as also with quality of the gas, which varies in different localities.

The crucible sizes are the largest of Dixon's Numbers which each furnace is intended for

Large Crucible Furnaces.

Nos	4½.	5.	6.	7.	8.	9.
	\$110.00	\$125.00	\$150.00	\$175.00	\$200.00	\$250.00

Large Size Crucible Furnaces.

Nos. 4½, 5, 6, 7, 8 and 9.

THE cut shows the smallest of our large size Melting Furnaces, which are identical in construction. The burner ring O is a solid casting, and the burner tips P are detachable, held in position by two ordinary carriage bolts which pass through a flange cast to the ring. The tips enter the bottom B diagonally through slots in the fire-clay and are tightly enclosed. To preserve them, fire-clay putty is pressed into the joint tightly, so that no flame can escape from the furnace through any crack or opening between the cast iron tips and the enclosing fire-clay lining. The bottom is held in position by the platform L, and bolts with wing nuts M, which pass through projecting jaws, so as to be easily released. The cylinder C, as also the bottom B are encased in sheet iron cylinders, held together by clasps Q which can be opened to replace the linings. The crucible rests upon a flat top cone which passes through the bottom and closes it, and is supported by a cross bar S. When moved out of the slot in which the bar S rests, the cone support drops with it, and the furnace bottom is open. The cylinder C is firmly held by bolts and clamps T, and a perfect joint between B and C is made by a thin layer of clay putty, spread upon the bottom. The cover D is attached to the cover lift V, which is so arranged, that by drawing forward the lever N it is lifted clear of the furnace and swings to one side easily.

These furnaces are in use in the U. S. Mints and Assay Offices for melting large quantities of gold and silver, by Silversmiths, Watch Case Manufacturers, for brass, copper, iron and steel, for special work; such testing and making alloys, and fine thin castings. We do not recommend this style of furnace for general in brass foundries, except where a cheap fuel gas is available, or our own gas machine is used.



Melting Furnace with Down Draft, FOR NATURAL GAS, WATER GAS, "CITY GAS" AND OIL GAS.

These Furnaces are built in Five regular sizes for Black Lead Crucibles, Dixon's Numbers.

No. of Furnace.	CAPACITY: Size of Black Lead Crucible.	Floor Space Required.	Consumption of "City" Gas per hour. Cubic feet.	PRICE.	Weight, Packed, About.
1	No. 25	36 x 30 IN.	300	\$115.00	1200 LBS.
2	No. 40	36 x 30 IN.	350	125.00	1400 "
3	No. 60	36 x 30 IN.	425	150.00	1650 "
4	No. 80	40 x 34 IN.	480	165.00	1830 "
5	No. 100	40 x 34 IN.	525	185.00	1860 "

Melting Furnaces

WITH "DOWN DRAFT,"

THESE furnaces are used for **silver, copper, brass, steel and iron**, and embody the novel feature of "down draft." The burner B enters the cylinder O tangentially and with a slightly downward inclination, so that the flame is injected into the air space between the crucible and lining N and the pressure under which the flame is injected secures its rapid spiral rotation downward around the crucible. The crucible is supported by a cylindrical fire brick support raised slightly above the level of the furnace base closed by the plug P. The crucible support is about 2 inches less in diameter than the surrounding cylinder, thus leaving a clear passage or slot about 1 inch wide around its outer edge, through which the exhausted flame passes into the bottom chamber connected with a chimney by the draft flue H. The hole in the cover is used to feed the metal into the crucible and to observe it. While melting, the feed hole is kept closed, the products of combustion and fumes being drawn off into the draft flue H. The cover lift is the same as on our No. 4½ and larger melters. Gas and air connections are indicated by G and A. The advantages secured by this construction are, that the burner is absolutely secure from obstruction by overflow, is easily detached for renewal of linings, utilizes gas fuel thoroughly without loss of "live heat," and carries off fumes with the products of combustion.

Soft Metal Furnaces.

THESE are melting furnaces for soft metals, such as lead, type metal, "Britannia," zinc, antimony, aluminum, etc., which can be melted in cast iron or steel pots and have the general features of our "Crucible Furnaces." The burners impart rotary motion to the flames, are further apart, and the heat less concentrated. The iron crucible or pot is flanged, so as to rest upon the fire clay lining. The products of combustion draw off from a vent in the rear, and a pipe connection can be made to a chimney, which however is rarely needed. The lighting hole in front is closed when in operation. Gas and air connections are indicated by the letters G and A.

Soft Metal Furnace No. 1 is identical with **Babbitt Melter No. 2**, shown on page 261.

These furnaces are made for any size of iron pot shown on "charts of pots," pages 262 and 263, or specially to order for any other shape or size.

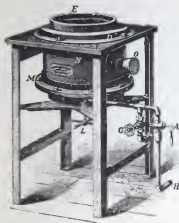
Oblong Troughs for continuous heating in lead or zinc, of wire, strips and spring stock of any length and size required, furnished to order. See cut of Soft Metal Furnace No. 7, on page 259.

Soft Metal Furnace No. 4 was made for the Julien Electric Co., for casting storage batteries, and for other similar purposes where a perfectly uniform temperature is required. It is also made with hood, on the plan of Cyanide Furnace No. 1, for drawing off poisonous fumes. Other sizes to order.

Soft Metal Furnace No. 5 is specially adapted for "lead hardening." It differs from other soft metal furnaces in having vertical burners (B) penetrating opposite sides, which secure a more even distribution of the heat between top and bottom of the pot, so as to heat evenly long bars of steel inserted vertically. Other sizes made to order.

The gas consume varies according to temperature required, and differs so greatly that estimates can only be made when the work is known.

Melting Furnaces with Iron Pots for Soft Metals.



Soft Metal Furnace No. 2.

Price \$50.00

Floor space 20 x 20 inches

Capacity Pot 8 in diameter, 6½ in.
deep, holding about 120 lbs.

Weight, packed, about 300 lbs.

Gas consumption,
per hour, about { 30 cubic ft.

Soft Metal Furnace No. 3.

Price \$65.00

Floor space: 27 x 27 inches

Capacity Pot 10½ in. diameter,
10 in deep, holding 225 lbs.

Weight, packed, about 560 lbs.

50 cubic ft.



Soft Metal Furnace No. 6.

Price \$85.00

Floor space 30 x 32 inches.

Capacity Pot 16 inches diameter, 12½
inches deep, holding 400 lbs.

Weight, packed, about 800 lbs.

80 cubic ft.

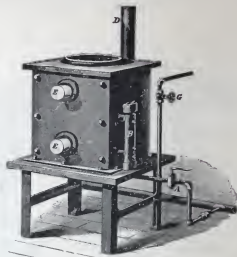


**Soft Metal Furnace No. 4 with Black Lead
Crucible No. 40.**

Price \$75.00

Black Lead Pot: $12\frac{1}{4}$ in. high, $9\frac{1}{2}$ in. diam. outside.
 Floor space: 27×27 inches.
 Capacity: 100 lbs.
 Weight, packed, about 300 lbs.

*Gas consumption per hour,
 about 50 cubic feet.*

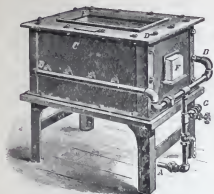


**Soft Metal Furnace No. 5
for Lead Hardening.**

Price \$60.00

Floor space: 18×20 inches.
 Iron Pot: 12 inches deep, 6 inches diameter.
 Weight, packed, about 500 lbs.

*Gas consumption per hour,
 about 50 cubic feet.*

**Soft Metal Furnace No. 7.****Price \$100.00**

Pot : 19 in. long, 10 in. wide, 7 in. deep.

Capacity : 450 lbs. lead.

Soft Metal Furnace No. 7.

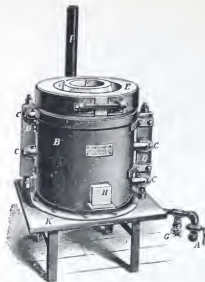
The cut represents the style of furnace used for melting lead and other soft metals, and for hardening in lead such work as steel blades, music box combs, etc., which requires elongated space. The furnace illustrated is used for melting aluminum and to keep it at a uniform temperature. The pot E is suspended in the heating space and is uniformly heated through by the burners B, which penetrate the body of the furnace from opposite sides. Gas connects at the valve G and air pressure at A, and the lighting hole is closed by the plug F.

Floor space : 38 x 28 inches.

Weight, packed, about 1200 pounds.

Gas consumption per hour, about 90 cubic feet.

NOTE:—In ordering, please state the purpose for which furnace is to be used. Lead hardening requires stronger burners than simple melting.



Lead Hardening Furnace No. 8

With Black Lead Crucible No. 20.

Price \$125.00

Floor space: 32 x 30 inches.

Capacity: about 100 lbs. lead.

Weight, packed, about 600 lbs.

Gas consumption per hour, about 80 cubic feet.

Made for any number of Dixon's Crucibles.

Price of other sizes on application.

Lead Hardening Furnace.

This style of furnace is designed for heating lead in black lead crucibles of any regular size for hardening steel work. The cut represents a furnace built for the No. 20 Dixon crucible.

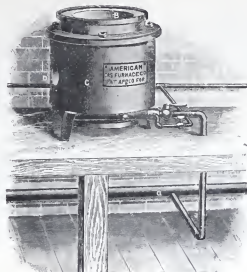
The distributing chamber D on opposite sides of the cylinder B are transposed so that the burners C enter the heating chamber tangent to the crucible F, thus securing a rotary action of the flame around the crucible without directly impinging upon it. The cover E encloses the crucible at the top, and the groove in the cover is filled with fire clay to make a tight joint. The lighting hole is closed by the block H, and products of combustion escape from the pipe I. Gas connects at valve G, and air, which must be under one pound pressure at A. A maximum heat is obtainable, and is easily regulated by the gas and air valves to exact requirements.

Any black lead crucible used for lead hardening **must be regularly emptied after each operation.** If the lead is allowed to cool and solidify, the crucible will crack when heated up again.

Babbitt Melters Nos. 1 and 2.



Capacity, 6 lbs.



Capacity, 25 lbs.

Babbitt Metal Melters are intended for melting and keeping at the proper temperature smaller quantities of Babbitt metal, and are usually placed on a work bench, as shown. We can supply them mounted on cast iron stand, same as soft metal furnaces, at an extra charge of ten dollars, including an air drum attached to stand.

No. 1 holds a pot which is removable by detachable handle C, and is a Ladle and Melting Pot in one.

No. 2 holds a pot which is too heavy for convenient handling, and the metal is dipped out by the ordinary ladle, Gas supply by $\frac{1}{8}$ inch pipe, reduced to $\frac{1}{4}$ inch near furnace.

For larger sizes of Babbitt Metal Melters see "Soft Metal Furnaces"

Bench space: 10 x 15 in. Weight, packed, about 40 lbs.

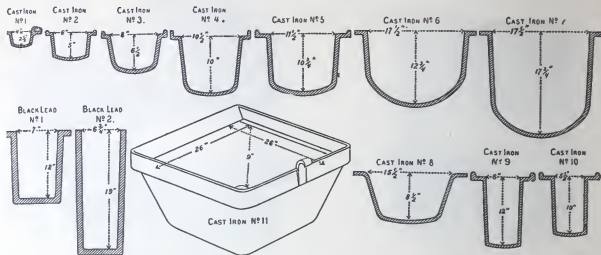
Gas consumption per hour, about 15 cubic ft.

Price 10.00

Bench space 12 x 16 in. Weight, packed, about 65 lbs.

Gas consumption per hour about 20 cubic ft.

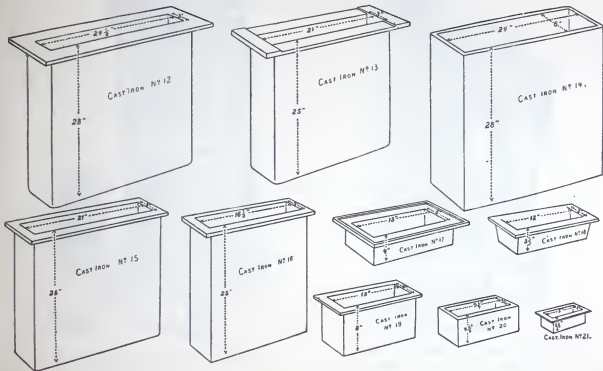
Price, \$15.00

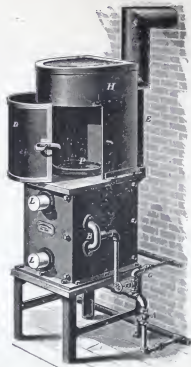


Charts of Pots used for melting soft metals and for heating cyanide or lead for hardening, and oil or tallow for tempering.

Furnaces are made to order for these sizes, or for any other size or shape desired.

Prices furnished on application.



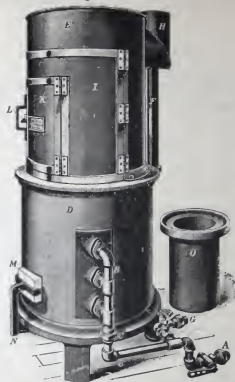


Cyanide Hardening Furnace No. 1

For Heating Steel Rolls, etc., in Cyanide.

Price \$100.00

Capacity: Pot 12 in. deep, 6 in. diameter, Floor space 28 x 20 inches.
 or 10 in. deep, 5½ in. diameter. Gas consumed about 50 feet per hour.
 Weight, packed, about 520 lbs.



Cyanide Hardening Furnace No. 3.

For Cutters, Dies, Rolls, Etc.

Price \$175.00

Capacity of Pot 18 in. deep, 9 in. diameter. Floor space 32 x 30 inches.
 Weight, packed, about 1000 pounds. Gas consumed about 100 feet per hour.

Cyanide Hardening Furnaces.

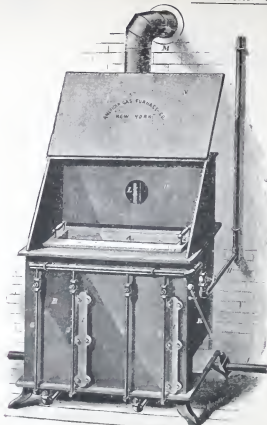
THESE furnaces are designed for heating steel work in cyanide of potassium for hardening, and are used by the leading Bank Note Engravers in the United States for hardening transfer rolls and engraved plates, and by manufacturers for hardening cutters, dies, springs, and other steel work requiring a hardened surface. Their general features are also utilized in apparatus for heating chemical solutions where the escape of poisonous fumes from the pot or caldron into the room must be prevented.

Cyanide Hardening Furnace No. 1 contains a cast iron or steel pot suspended by a flange with raised edge in the center of the heating chamber. The two opposite burners B B inject the flames into the space between the pot and surrounding fire brick lining, and heat the pot evenly without coming in direct contact with it. The two lighting holes in front are closed after the furnace is put in operation, and the products of combustion find their outlet in the pipe E, which extends upward in the rear and enters the elbow on the sheet iron pipe S, passing the draft hole near the top of the hood H. The heat from the combustion chamber is thus injected into the draft pipe S, and a positive draft is created which carries off the fumes as they rise from the pot. Thus the poisonous fumes are carried off into the chimney, and with ordinary care none escapes into the room. Gas and air are indicated at G and A.

Cyanide Hardening Furnace No. 3 is similar in construction and the same in operation as the No. 1.

MADE FOR:—The American Bank Note Company, N. Y.
Bureau of Engraving and Printing, Washington.
International Bank Note Co., N. Y.
Baldwin & Gleason Co., N. Y.

The Franklin Bank Note Company, N. Y.
Bureau of Engraving and Printing, St. Petersburg,
Western Bank Note Company, Chicago.
Bradbury, Wilkinson & Co., London, Eng., etc., etc.



Cyanide Hardening Furnace No. 2.

For Heating Steel Plates in Cyanide.

Price \$250.00

Capacity 21 inches long, 25 inches deep, 3 inches wide.

Gas consumed 200 feet per hour.

Cyanide Hardening Furnace No. 2.

For Steel Plates.

This furnace for heating steel plates in cyanide, differs from the round furnace illustrated on page 264 only in shape. The pot A is 25 inches deep, 21 inches long and 3 inches wide. Its flange D rests upon the top of the surrounding body B, thus closing the heating chamber on top and suspending its pot in the center. The heat is distributed by four vertical burners C C, which emit numerous small jets into the space between the pot and surrounding fire brick lining, and are directed so as to create a rotary motion around the pot. G, G, G, G, are the gas supply pipes which, with an equal number of air cocks below the furnace, enable the operator to control the different burners **separately**, while a main gas valve and air gate K control both supplies for all burners alike. The furnace is lighted in the hole F, and a corresponding opening on the opposite side affords opportunity for sweeping out the bottom of the furnace easily. The hood catches the fumes, and can be closed by the cover N. L is an "injector" through which the waste is injected into the draft pipe M, and by means of which a draft is secured which carries off the fumes from the pot as fast as they arise.

The gas consumed averages 200 feet per hour, and the furnace is ready for work in 35 minutes from lighting.

The heat is under perfect control and easily regulated to requirements. The apparatus has been highly praised, but we are unable to submit testimonials, which our customers, for reasons of their own, have refused.

Weight, packed, about 1600 lbs.

Carbonizing Furnace No. 1.

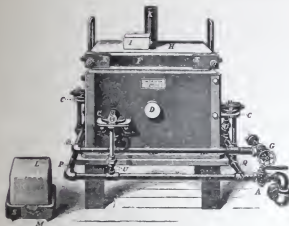
This furnace is designed for carbonizing incandescent lamp filaments, and fulfills the following conditions:

The square retort L is heated up under a very mild heat which can be gradually increased to a perfectly white heat, and the burners are under such perfect control that any gradations of heat desired can be easily obtained by the proper adjustment of the gas and air supply valves.

After charging the retort L, the cover S is put on and retort is inverted, cover down, which is luted by fire-clay cement, indicated by the reference letter M, and thus a perfectly tight joint made. The retort rests upon fire brick supports, so placed that the circulation of the heat around the retort is unobstructed. The burners B inject the flames into the space between the retort and furnace linings, but do not impinge upon it, and a complete rotation of flame around the retort is thus secured.

Gas connects at G, and the air, which must be under a pressure of 1 lb. to the square inch at least, connects at A.

The mildest flame attainable in this furnace is about that of the Bunsen burner. The maximum heat obtainable will melt nickel, and is secured by running the blower under $1\frac{1}{2}$ to 2 lbs. pressure.



Carbonizing Furnace No. 1.

Price \$115.00

Retort: 8 x 6 inches inside measure.

Floor space: 44 x 32 inches.

Weight, packed, about 900 lbs.

Gas consumption per hour, about 100 cubic feet.

Muffle Furnaces.

THE following illustrations are types of the different styles of furnaces we make. In making a selection, we advise customers to specify the purpose for which the furnace is intended, so that we may advise the style of furnace and kind of muffle best adapted to the work. For bearing heavy weights we provide special supports for the muffle bottom, and in many cases insert special burners to secure a more gradual heating-up of the muffle, than in furnaces for ordinary enameling of light work, such as watch dials, jewelry, etc.

GENERAL DESCRIPTION.—The muffle is enclosed by a fire-clay chamber conforming approximately to the shape of the muffle, which fits snugly into a recess in the front lining and rests upon a ledge in the back lining. The back of the muffle is covered by a fire-brick slab which fills out the back entrance, and is secured by an iron plate which holds the slab firmly against the back of the muffle by means of wing nuts.

The burners B project into the combustion chamber horizontally, from opposite sides and **force** the flame into the space surrounding the muffle, its equal distribution being aided by the shape of the furnace lining.

Muffle furnace No. 3 and all larger sizes are mounted on a high stand, bringing the entrance to the muffle up to a convenient height for the operator.

Air drum and pressure relief valve. The following description applies to all furnaces having the drum and valve mounted in the stand. The air drum is applied for the purpose of securing a **steady** blast from the blower, which otherwise would be pulsating. Referring to cut of muffle furnace No. 3 on page 271, the valve on the air drum A is a relief valve to release pressure not required for the desired heat. It is weighted down by iron discs placed on the pin, **each** disc securing a pressure of $\frac{1}{4}$ lb. to the square inch, so that it is variable by $\frac{1}{4}$ pounds by adding or removing these discs. The usual pressure required is one pound, which is obtained by placing two discs on the pin, the valve itself securing the minimum of $\frac{1}{2}$ lb. The desired pressure is indicated when the valve lifts and steadily "blows off" with valve properly weighted, and while the air cock A is wide open.

We are warranted in claiming a superiority over all other such furnaces, in the following particulars

In economy, because practically the whole heating power of the gas is applied to the muffle without any loss other than the heat which necessarily escapes with the product of combustion.

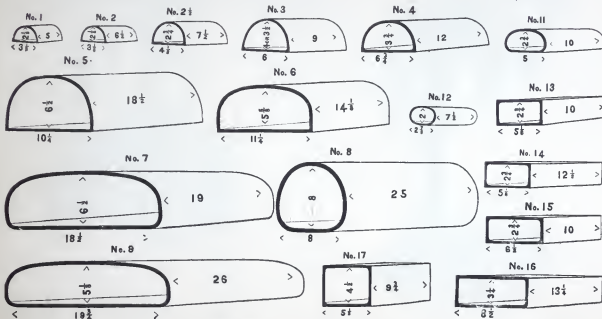
In efficiency, because the burner is under perfect control, distributes the heat evenly, and can be regulated so as to steadily maintain any desired degree of heat.

In durability. The linings are made of the best mixtures of fire-clay known, are put together perfectly, and the iron casing is effectively protected from heat. Muffles are replaced easily and quickly by opening the rear entrance.

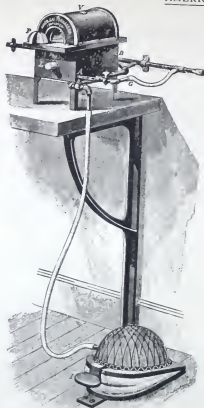
Regular Sizes of Muffles.

The annexed chart shows the regular sizes of muffles which we keep on hand. The number of the muffle corresponds to the number of the furnace, so that orders for the muffles can be given by the furnace number, or a furnace ordered by the number of the muffle.

The dimensions of muffles are their interior measurement



For price list of furnaces for above muffles, see page 270.



Muffle Furnaces Nos. 1 and 2.

To be placed on Bench and run with Foot Bellows or Blower.
 Size of Muffle No 1, 5 x 3 x 2 in. No 2, 6½ x 3½ x 2½ in.

Price \$15.00- \$18.00

Muffle Furnaces Nos. 1 and 2.

These furnaces can be placed on a work bench or shelf and run by foot bellows or pressure blower. Connections are usually made with ¾ rubber hose, with gas and blast.

Where power is used, a tin reservoir with pressure relief valve is placed between the blower and furnace, preferably beneath the bench, and connections between the blower, reservoir and furnace made with 1 inch tin pipe, and with gas supply by ½ inch pipe.

The foot bellows must be steadily worked so as to keep the network tightly expanded.

Price of Foot Bellows, extra, \$5.00

" Reservoir and Relief Valve, extra, 3.50

PRICE LIST AND DESCRIPTION OF MUFFLE FURNACES.

Number.	Size of Muffle.	PRICE.	Estimated Gas Consume per hour, Cubic feet.	Floor Space, Inches.	Weight, packed, about
1	See Chart of Muffles on page 269.	\$15.00	20	10 x 11	50 Lbs.
2		18.00	25	10 x 12	65 "
2½		35.00	40	14 x 16	225 "
3		50.00	50	24 x 24	300 "
4		85.00	75	24 x 24	470 "
5		125.00	125	30 x 36	1230 "
6		125.00	125	24 x 33	1000 "
7		200.00	150	34 x 37	1550 "
8		250.00	150	34 x 44	1920 "
9		250.00	175	42 x 44	1900 "
11		50.00	55	24 x 24	400 "
12		50.00	35	24 x 24	400 "
13		50.00	55	24 x 24	375 "
14		50.00	60	24 x 24	400 "
15		60.00	60	24 x 24	400 "
16		75.00	80	30 x 26	500 "
17		50.00	65	24 x 24	450 "



Muffle Furnace No. 3.

Price \$50.00

Size of Muffle: 9 in. deep, 6 in. wide, 4 in. high.

Floor space: 24 x 24 inches.

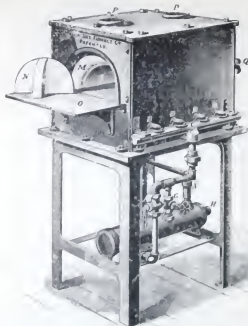
Muffle Furnace No. 3.

The cut shows the furnace as shipped. When connected with $\frac{3}{4}$ gas supply at G, and blast with tin drum at A, it is ready for work. The burner B can be **detached for renewal.**

The valve X on the air drum A is the relief valve for pressure exceeding that required for the desired heat. It is weighted with discs placed on the pin, **each** securing a pressure of $\frac{1}{4}$ lb. to the square inch, so that the pressure is variable by $\frac{1}{4}$ pounds, by adding or removing these discs. The usual pressure required is **one pound**, which is obtained by placing two discs on the pin, the valve itself securing the minimum pressure of $\frac{1}{2}$ pound. The desired pressure is indicated when the valve lifts and steadily "blows off" with valve properly weighted and while the air cock A is wide open.

The plug Y closes the lighting hole. K are wing nuts by which the back plate is held, and I is a plug to close entrance to the muffle, with vent hole for the escape of the products of combustion.

For complete List of Muffle Furnaces, see page 270.

**Muffle Furnace No. 5.**

Price \$125.00

Muffle 18 in. deep, 10 in. wide and 6 in. high.

Floor space— 30 x 36 inches.

Muffle Furnace No. 5.

This style of furnace is typical of large sizes for heavier kinds of work requiring high heat. It is entirely encased in cast iron framework firmly bolted together, with heavy linings of carefully trimmed and fitted fire-clay sections. The square casing is filled in above and around the arch with non-conducting material to lessen radiation, and the muffle bottom is protected by extra supports, as in oven furnaces, to prevent sagging under weight.

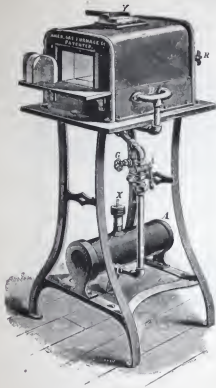
Excepting the square top, the furnace is identical in construction with No. 3. Air connection is made to a nipple H on the drum A by 2 inch tin pipe. Gas connects by $\frac{3}{4}$ inch pipe from a one inch supply pipe under the valve G.

The entrance M is through a heavy front lining, and is closed by a solid plug N

The lighting hole is at P.

The muffle L can be supported by a heavy slab to bear extra weight, if so ordered

For complete List of Muffle Furnaces, see page 270.



Muffle Furnace No. 17.

Price \$50.00

Floor space: 24 x 24 inches.

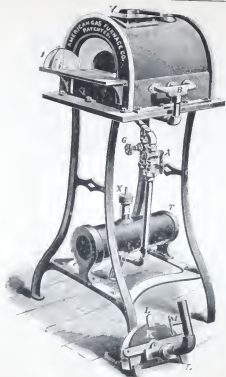
Muffle Furnaces for Steel Work.

Muffle furnace No. 17 illustrates a type of muffle furnaces made in great variety for **steel work**. The square shaped muffle is preferable to the usual **arched** muffle, because the work placed within is more **equally** distant from the surrounding muffle wall. They are used for heating dies, cutters, springs, taps, drills and small work in boxes. Nearly all **sewing machine needles** are now heated in these furnaces for hardening, and they are preferable for any kind of steel work, of which quantities are to be heated evenly to anneal or harden them:

We recommend "Oven Furnaces" for the work mentioned except where the contact of the work with direct heat, or the products of combustion should be avoided, and in all cases where gas used contains considerable sulphur.

For complete List of Muffle Furnaces, see page 270.

Assay Furnaces.

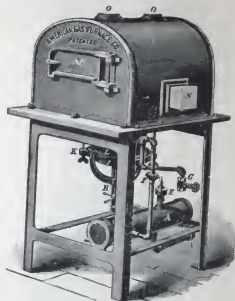


U. S. Assay Furnace Nos. 1 and 2.

Price \$65.00—\$125.00

Floor space: 24 x 24 inches.

For complete List of Muffle Furnaces, see page 270.



Muffle Furnace No. 6.

Price \$125.00

Extensively used for Assay work.

Floor space: 29 x 33 inches.

NOTE:—Burners are now made as shown in opposite cut.

Assay Cupelling Furnaces.

THE construction of these furnaces is the same as that of other muffle furnaces, excepting the necessary provision for draft through the muffle. The back entrance of the furnace is closed by the door K, shown detached in annexed cut. A fire brick disc fits snugly into the rear entrance. It contains a draft channel corresponding to that in the muffle back, which communicates through the iron door K with the draft pipe M, and is extended to a chimney by ordinary small stove pipe. The handle M moves an ordinary damper to lessen the draft if required, and the short piece of pipe is detachable by drawing it out of the elbow to facilitate cleaning of the flue and insertion of new muffles.

U. S. Assay Furnace No. 1 is extensively used by gold and silver refiners and in laboratories which have power. Size of muffle: $9 \times 6 \times 3\frac{3}{4}$ inches.

U. S. Assay Furnace No. 2 is the **standard size** in use in the U. S. Mints and Assay Offices and in the Mint Bureau and U. S. Patent Office at Washington. Size of muffle: $12 \times 6\frac{1}{2} \times 4$ inches.

Large furnaces for assay work are made of any desired size, usually in the style of Muffle Furnace No. 6, which contains the following size of muffle, $14 \times 11 \times 5\frac{1}{2}$ inside measure.

UNITED STATES ASSAY OFFICE.

Messrs. E. P. REICHHHELM & Co.,

30 Wall Street, New York, May 8, 1886.

GENTLEMEN:—After using in our daily work for over a year, your improved **assay cupelling furnaces**, side by side with the old-fashioned coal furnace, I take pleasure in endorsing it as thoroughly satisfactory and effective in every respect.

The advantages are: **cleanliness, economy of time in heating, uniformity of heat, and ease of adjustment to different classes of work.** Gold assays may be worked in this furnace **at high temperatures, and within five minutes** the temperature can be **reduced** so as to allow of **silver being cupelled with accuracy.**

Your melting furnaces have also been in use in this office for more than a year, and have been found very useful and effective. The "**Little Giant**" furnace attains an **intense heat in a very few minutes**, five ounces of gold having been melted in five minutes.

Very respectfully,

H. G. TORREY.

U. S. Assay Furnace No. 2.

THE cut shows a regular size U. S. Assay Cupelling Furnace placed upon a solid cast iron stand or table and enclosed by a perfectly made galvanized sheet iron hood, by which the radiated heat from the furnace is drawn off, leaving the temperature of the room in which it is placed practically unaffected. The furnace proper is mounted on short legs L, is shoved into the hood from the rear through the door E, and the entrance to the muffle is 3 inches back of the front lining of the hood, so that heat from the mouth of the muffle is drawn upward into the hood instead of radiating against the operator. For repairs and relining, the furnace is easily removed from the hood by unscrewing the unions G A, which connect it with gas and air supply. The draft pipe K is 6-inch stove pipe connected with chimney. The draft pipe from the muffle enters it in the centre and serves to accelerate the draft in the chimney sufficiently to draw a large quantity of air through the hood, and to keep it comparatively cool.

United States Assay Office, Charlotte, N. C.

OFFICE OF ASSAYER IN CHARGE.

E. P. REICHELME & Co.,

New York City,

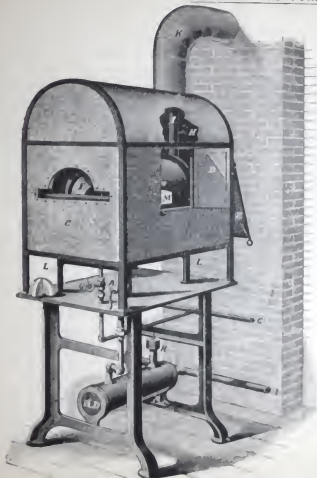
October 1st, 1892.

GENTLEMEN:—I enclose to you my check The plant is a very complete one and extremely satisfactory in every detail. I have tried it for three weeks before passing upon it, and feel safe in saying it is all you claim for it.

Very sincerely yours,

STUART W. CRAMER,

ASSAYER IN CHARGE.



U. S. Assay Furnace No. 2 with Hood.

Floor space: 3 x 2 feet.

Height to muffle entrance: 4 feet, 4 inches.

Muffle: 12 inches deep

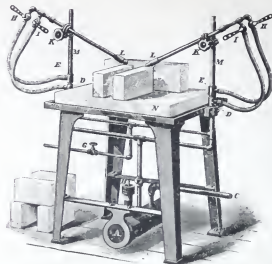
6½ wide

4 high.

This is the standard size in use in the United States Mints and Assay Offices.

Price \$130.00

Weight, packed, about 900 pounds.



Brazing Table No. 1.

Price \$50.00

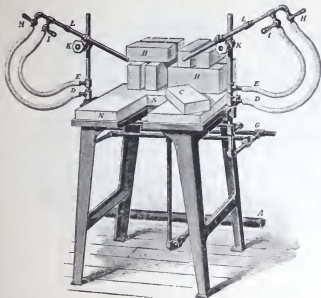
Floor space: 20 x 25 inches.

Weight, packed, about 300 lbs.

Gas consumption per hour, about 50 cubic feet.

Brazing Tables.

Brazing Table No. 1. This is a convenient Forge for brazing joints in various positions. The Blow Pipes L L are **pivoted** and **hinged** so as to be easily adjusted to any desired angle or height by the set screw K, which controls both pivot and hinge, so that when released the blow pipes can be placed in any position and secured by tightening the set screw K. N is a fire clay slab, 14 inches square, and the fire brick O P Q can be moved and placed so as to enclose the joint to be brazed and thus concentrate the heat upon the desired spot. A few extra bricks afford the opportunity to enclose any desired space. Gas connects at G and air at C. The air pressure is controlled by the escape valve B, which has detachable weights, and can be varied from $\frac{1}{4}$ to $\frac{3}{4}$ and 1 pound to the square inch, according to heat desired. It was built for bicycle work, but has since found favor with manufacturers for many other purposes.

**Brazing Table No. 2.**

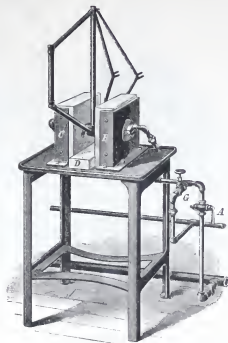
Price \$45.00

Floor space: 20 x 25 inches.
 Height to top of slab N, 30 inches.
 Weight, packed, about 300 lbs.

Brazing Table No. 2 same as No. 1, except Air Drum. The slot S in table can be had with either size.

Drum is required for repair shops or where only one table or furnace is used.

Gas consumption per hour, about 50 cubic feet.

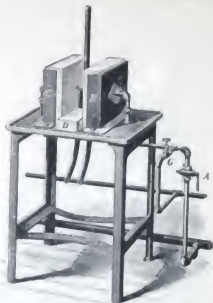
**Brazing Table No. 3.**

Price \$45.00

Floor space: 24 x 20 inches.
 Height to centre of burners: 40 inches.
 Distance between burners: 4 inches, or as ordered.
 Weight, packed, about 265 lbs.

For brazing the principal joints of the frame proper, in the manner illustrated.

Gas consumption per hour, about 60 cubic feet.

**Brazing Table No. 4.**

Price \$40.00

Floor space 24 x 20 inches.

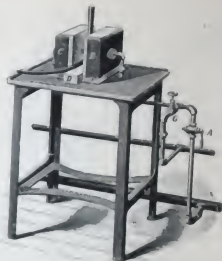
Height to centre of burners 40 inches.

Distance between burners 4½ inches, or as ordered.

Weight, packed, about 265 pounds.

Gas consumption per hour, about 50 cubic feet.

For brazing forks in positions shown or in reverse position.

**Brazing Table No. 5.**

Price \$35.00

Floor space 24 x 20 inches.

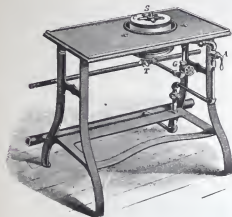
Height to centre of burners 37 inches.

Distance between burners 4 inches, or as ordered.

Weight, packed, about 200 lbs.

Gas consumption per hour, about 25 cubic feet.

For brazing handle bars, also to heat the same for bending.

**Brazing Table No. 6.**

Price \$35.00

TO BRAZE SPROCKETS TO SHAFT.

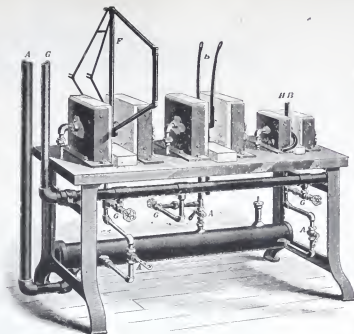
Floor space: 29 x 30 inches.

Height: 30 inches.

Weight, packed, about 240 lbs.

Gas consumption per hour, about 35 cub. ft.

The sprocket wheel is placed on the fire-brick disc C, shaft down, and three burners project the flame against the joint, evenly around it.

**Brazing Table No. 7.**

Price \$135.00

THREE-FIRE BRAZING TABLE.

Floor space: 60 x 30 inches.

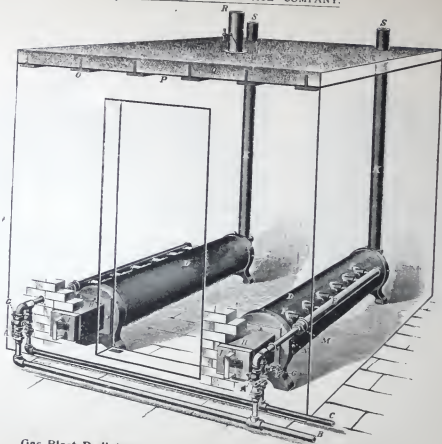
Height to burners: 39 inches.

Weight, packed, about 800 lbs.

Gas consumption per hour, about 140 cubic feet.

This is a compact and convenient combination of three fires, useful where space is lacking. The man working at the central fire is supposed to face two men working opposite, at each end.

AMERICAN GAS FURNACE COMPANY.



Gas Blast Radiators, No. 2, for Japanning or Enameling Ovens.

Price for Radiators 8 ft. in length, per pair, \$100.00

Price for each additional 1 foot in length, per pair, \$10.00

Gas Blast Radiators, Pattern No. 2.

* For Japanning or Enameling Ovens.

THIS cut illustrates the application of Gas Blast Radiators, No. 2, in japanning or enameling ovens built of brick. If built of other material, the mouth H, which penetrates the front, is shortened to correspond to the thickness of the front wall.

For ovens having an interior width of over 6 ft., two radiators are used as shown in the cut. For narrow ovens one radiator may be placed in the centre under the floor line.

The radiator consists of a heavy wrought iron tube, approximately of the interior length of the oven, with cast iron front and back. The burners F enter the wrought iron tube D tangentially, and the flame emitted from them follows the inner circle of the tube, thus heating a large radiating surface. The heat is accurately controlled by reference to a thermometer usually placed in the door of the oven, by the gas and air supply valves.

The products of combustion escape through the vent pipes K.

The air supply must be under pressure of 1 lb. to the square inch, and connects with the air pipe B. The gas pipe C supplies both radiators.

The ovens can be vented either from the bottom or the top, a damper being interposed in the vent pipe, as shown in R, to prevent the unnecessary escape of heat.

We claim the following advantages for this system:

There is no contact or inter-communication between the heating flame and the atmosphere in the ovens, and the fumes generated cannot be ignited from the radiator. The control of the temperature is absolute. Any required degree of heat can be maintained steadily and uniformly by proper adjustment of the gas and air valves. A low range of heat can be maintained steadily, and the temperature raised as quickly or gradually as may be desired.

That there are no other means of heating japanning ovens now in practical use which are equally efficient and reliable, is the concurrent testimony of numerous patrons who have tried all other devices in common use.



Plating Furnace

FOR SOLDERING OR SWEATING PLATE.

Price \$65.00

Floor space: 26 x 23 inches.

Height of table: 33 inches.

Capacity: 12 inch ingots.

Gas consumed: 50 to 60 feet per hour.

Weight, packed, about 300 lbs.

(Any desired size to order.)

Plating Furnace for Soldering Gold Plate.

This furnace is extensively used by manufacturers of plated jewelry and "filled" or plated watch cases, and is equally adapted for soldering or sweating plate.

The heating chamber A, with adjustable cover B, shown in annexed cut, is 14 inches long, 4½ inches wide and 5 inches deep between bottom and cover, and is used for ingots 12 inches long, 2½ inches wide and any required thickness.

We have greatly simplified the construction by the application of solid iron burners, which emit numerous small jets of flame from under the side lining, near the bottom, and have their focus directly under the centre line of the ingot, which is raised ¾ inch above the bottom brick.

The burner cannot be injured or obstructed when the ingot is inserted, and the lining is easily removed and replaced without disturbing the working parts of the furnace.

As to the efficacy of this furnace we refer to testimonials:

AS TO THE OLD STYLE:

J. BRIGGS & SONS, Gold and Silver Platers,
65 Clifford Street,

PROVIDENCE, R. I., April 25th, 1883.

MR. E. P. REICHHELM:

DEAR SIR:—We have used your patent machines for melting, plating and annealing, and find them very satisfactory in every way. They do the work faster, better and cheaper than the forges, and are much cleaner and neater.

Very respectfully

J. BRIGGS & SONS.

AS TO THE NEW FURNACE:

Watch Case Department of H. MUHR'S SONS,
S. W. cor. Broad and Race Streets,

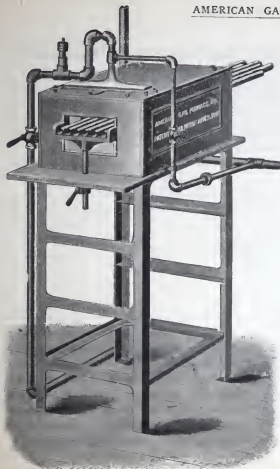
PHILADELPHIA, April 18th, 1887.

MESSRS. E. P. REICHHELM & Co., N. Y.

GENTLEMEN:—In answer to your inquiry respecting the new Plating Furnace, we can only say it *works perfectly*.

Yours truly,

H. MUHR'S SONS.



Furnace for Soldering Brass Tubing.

Furnace for Soldering Brass Tubing.

This furnace was first made for The Coe Brass Manufacturing Co., of Torrington, Conn., and is in successful operation.

The burner is inserted in the top of the furnace and points downward, with a slant toward the rear, and distributes the heat with perfect evenness across the full width of the furnace.

On passing through the furnace from the rear the tubing is subjected to a gradually increasing heat until the soldering point is reached, which is about six inches from the mouth of the furnace.

The gas consume will range from 150 to 200 feet per hour according to quality of gas. The air pressure required is not less than one pound to the square inch. The time required for heating up is about 30 minutes.

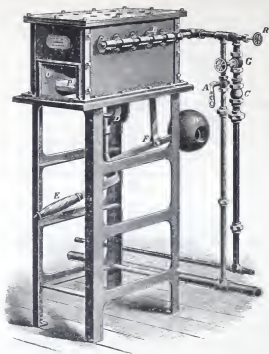
The furnace is complete in itself and when placed in position and connected is ready for work.

It is especially effective in connection with **Gas from our Oil Gas Machine.**

Floor space 37 x 28 inches.

Weight, packed, about 970 lbs

Gas consumption per hour, about 200 cubic feet.



Soldering Furnace with Movable Platform.

Price \$100.00

Floor space 26 x 24 inches.

Weight, packed, about 760 lbs.

Gas consumption per hour, about 100 cubic feet.

Soldering Furnace with Movable Platform.

This furnace was designed for soldering staples and backs to harness trimmings, for soldering watch case backs and other similar work, in quantities, instead of single by the blow pipe.

The burners B entering the heating chamber from opposite sides distribute the heat evenly, and can be regulated as required for the work. The heat is reflected downward upon the platform P, covered by fire brick slab. When thoroughly heated to the required degree, a tray containing the work properly charged with solder is placed upon the platform P and raised into the heating chamber by lifting the handle E. The work can be observed by raising the platform to about the point O, or for heavy work a peep hole can be provided above the entrance. When the solder has run, the platform is instantly lowered and the tray removed. While the perfect soldering of a large number of articles simultaneously depends upon a correct adjustment and even distribution of the heat which this furnace accomplishes, we do not claim that by its use the skill and judgment of the operator can be replaced. Properly handled after such preliminary experience as the introduction of a new tool usually requires, it is pre-eminently a time and labor saving device.

Gas Blast Soldering Iron Heaters.

The cut shows the three sizes regularly made. The burner enters a narrow combustion chamber below the rest, affording a free passage for the flame under the heavy part of the iron without contact with its point.

They are placed and connected as shown, and where other gas furnaces are used, the air drum A is dispensed with and connection made from a 2 inch pipe, instead of the drum shown in cut. G is gas and A the air valve. When permanently located connections are made by gas pipe and tin pipe, in preference to rubber tubing. The heat is under perfect control.

Made for any kind of gas, and any size to order.

No. 1 holds 2 lb. soldering irons. Gas consumption 10 cubic feet per hour.

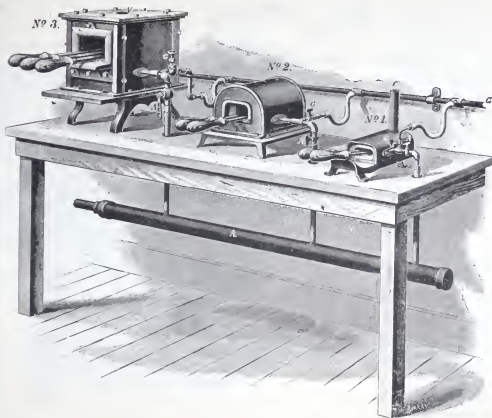
No. 2 holds 4 lb. soldering irons. Gas consumption 12 cubic feet per hour.

No. 3 holds all larger sizes soldering irons. Gas consumption, 18 cubic feet per hour.

No. 1	2	3
Price \$7.00	\$15.00	\$25.00

Bench space: No. 1, 12 x 11;
No. 2, 15 x 11; No. 3, 18 x 15
inches.

Weight, packed, about: No.
1, 25 lbs.; No. 2, 50 lbs.;
No. 3, 150 lbs.



BLANK ANNEALER AND WATCH CASE FLATTENER.

The Blank Annealer is a press in which the upper disc C is heated from the burner D above it, and the lower disc B resting on a surrounding flange A, is heated from below. The metal to be flattened is placed upon the disc B, and by pressing upon the lever F, is quickly and thoroughly annealed and straightened. The space between the discs is $1\frac{1}{2}$ inches, and they are $3\frac{1}{4}$ inches square. Made to order in any desired size.

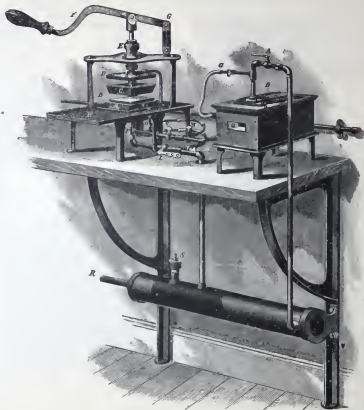
For flattening watch case backs the upper disc is a round die, turned to size of watch case or back, with a corresponding burner above it. The watch case being placed upon the lower disc the heated die is pressed into it and it is thoroughly and evenly annealed and straightened instantly.

We have sold fifty of these presses to watch case makers, and they give perfect satisfaction.

Price \$40.00

Bench space: 14 x 16 in.
Weight, packed, about 75 lbs.

Gas consumption per hour, about 35 cub. ft.



TUBE SOLDERING FURNACE FOR SMALL TUBING.

This is an efficient Furnace for soldering small tubing for Pencil Cases, Pen Holders, etc. The burner B covers 7 inches and directs the flame diagonally from the top to the lower left hand corner of the heating chamber. The burner is graduated in strength from front to rear, so that the tube joint receives the greatest heat just as it leaves the furnace. G is the gas, and A the air pipe, the latter from an air reservoir beneath the bench as shown.

Price \$25.00

Bench space 9 x 10 in.

Weight, packed, about 60 lbs.

Gas consumption per hour, about 25 cub. ft.



**Furnace for Boiling Acids
in Earthenware Pot.**

Price \$35 00

Floor space: 20 x 20 inches.

Weight, packed, about 300 lbs.

Gas consumption per hour, about 25 c. ft.

Furnace for Boiling Acids

In Earthenware or Black Lead Pot.

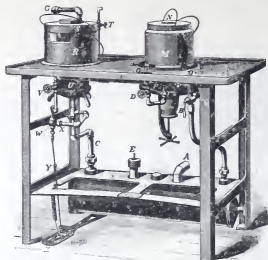
This furnace is designed for boiling acids under a nice regulation of heat and without subjecting the pot to the direct action of flame.

The burner enters the combustion chamber B, at E. The heat rises into the larger heating chamber H, and is easily distributed under and around the bottom of the pot P, which can be lowered if desirable, by changing the ring which holds it.

The burner is so located that it is protected from overflow or leakage, and the bottom can be removed by letting it down by the thumb-nuts F.

G is the gas, and A the air valve.

The advantage of this style of furnace is the perfectly even heat applied to the pot without impinging flame, the higher heat which the pot can stand in consequence, and nice adjustment of the degree of heat.



**Melting and Annealing
Furnaces in-One Table.**

Price \$100.00

Melting Furnace No. 2, same
as on page 247, and **Annealing
and Boiling-out Furnace.**

Floor space: 21 x 41 inches.

Gas supply $\frac{3}{4}$ inch pipe.

Weight, packed, about 350 lbs.

*Gas consumption per hour,
about 100 cubic feet.*



Melting and Annealing Furnaces in One Table.

These two furnaces in one table are a favorite combination. The Melter is our regular No. 2 described on page 247.

The **Annealing and Boiling-out Furnace** is also made on separate stand to order. The burner U is made of a peculiar composition of fire-clay and other substances pressed in a steel form under great pressure, and is fire and acid proof beyond any substance known to us. The burner is 6 inches in diameter and 3 inches in thickness, and is perforated for numerous small jets of flame. The burner is enclosed in cast iron, with a flange, resting upon the table. The fire-clay ring R, encased in sheet iron, is $6\frac{1}{2}$ inches in diameter, 5 inches deep. The slot is 4 inches wide and 2 inches high—clear inside space. An annealing box 5 inches in diameter (see X) is placed in the furnace for annealing small work. Bars are drawn through the slot.

For boiling out, the cover S is removed and the pickle pan is inserted, its handles resting in the slot.

T is the gas supply of a torch or pilot-light which must be taken from a source other than the furnace supply. See remarks on foot of page 292.

The treadle Z, connects with the spring valve W, and opens and closes the main gas supply which is regulated by the valve V.

The furnace is lighted by pressure of the foot upon the treadle, and its removal therefrom stops it instantly, leaving only the torch burning.



Sweep Reducing Furnace.

The **sweep reducer** is a gas **blast** furnace especially designed for Jewelry Factories, for burning to ashes **floor sweeps, hand wash** and **polishings**. The iron caldron or pot D rests upon the top rim of the lining, which is a solid fire brick cylinder incased in iron E, and is heated by a burner which distributes the heat evenly around the pot. The combustion chamber under and around the pot is completely shut off from the upper part of the pot. The products of the combustion are injected into the stove pipe H by the pipe G, and the smoke or fumes which arise from the pot into the upper part of the hood A are rapidly expelled through the pipe H, which connects with the chimney. The door C gives access to the pot for changing it. To remove the pot or insert it, the front half of the hood hinged on top, is opened upwards. Connection with gas is by $\frac{3}{8}$ pipe K to the valve I. The air pipe must be brought **down to** or near the floor and connect with air pipe L on furnace by an upward turn, as shown in cut.

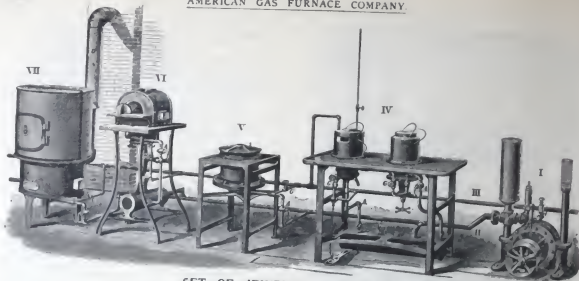
This style of furnace **is used for other purposes** where **offensive fumes** are to be drawn off as they arise from the caldron.

Floor space · 27 x 36 inches.

Weight, packed, about 560 lbs.

Gas consumption per hour, about 50 cubic feet.

For larger size, see pot No. 11, page 262. Price \$225.00.



SET OF JEWELERS' FURNACES.

The above cut shows the Furnaces usually required in a Jewelry Factory.

I is a No. 1 High Pressure Blower.

II is the 2 inch Distributing Pipe for Air.

III is the 1 1/4 inch Gas Supply Pipe which should come from (nothing less than) a 20 light meter.

IV is a No. 2 Melter and Annealing Furnace combined, as shown on page 290.

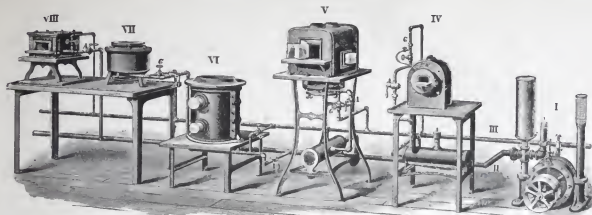
V is a Round Annealer No. 1.

VI an Enameling Furnace with Muffle No. 3, also used for heating Dies, Cutters, and Small Tools.

VII is a Sweep Reducer.

This set of Furnaces is subject to such variation as the nature of the business requires, but contains the indispensable apparatus for a complete outfit.

The Furnaces can be placed any distance apart, distributed in different parts of the shop, but the piping should be the same in principle—the air supply pipe near the floor, and gas pipe from a separate meter with branches to each Furnace made in most convenient way. The small pipe running upward from Annealer (IV) feeds the torch, and should connect with the supply of gas for Light, etc., and by no means with the pipe that supplies the Furnaces. The reason is, that the suction on the Furnace supply will put out the small "Torch" frequently when one of the Furnaces is turned on quickly, thus making the torch unreliable.



SET OF FURNACES FOR A MACHINE SHOP.

The above cut is intended to show the manner of connecting several furnaces frequently used in machine shops.

I is a No. 1 High Pressure Blower.

II is the Distributing Pipe for blast.

III is the Gas Supply Pipe, not less than 1 inch from a 20 light meter.

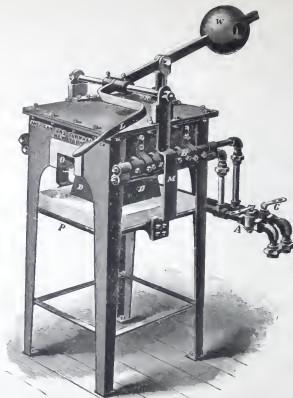
IV is a No. 1 Gas Forge for forging and dressing tools.

V an Oven or Muffle Furnace No. 17 for heating Dies, Cutters and Tools for **hardening**, etc.

VI is a Lead Bath, soft Metal Furnace No. 5.

VII is Babbitt Metal Furnace, No. 1 or 2.

VIII is a Soldering Iron Heater, frequently used in place of a Bench Forge.



Die Hardening Furnace.

Price \$150.00

Die Hardening Furnace.

This furnace is especially designed for heating the face of dies for hardening with a view to leaving the main body soft or less hard than the face.

The heating chamber is on top, with burners B entering opposite sides and projecting the flame against the top lining and distributing it evenly. When the furnace is thoroughly heated, the die is placed upon the platform P and raised into the heating chamber by the counterweighted lever L. The face of the die can be observed through the opening O, and when heated to desired degree, the platform is lowered, the die withdrawn and treated as usual.

Both burners are controlled by the gas and air supply cocks G and A, and the counterweight ball W can be shifted so as to about balance the weight of the die.

Floor space 32 x 30 inches.

Weight, packed, about 1500 lbs.

Gas consumption per hour, about 400 cubic feet.

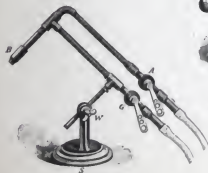
Compound Blow Pipes.

Blow Pipes must be adapted to the different kinds of Gas in order to work properly, and in ordering, the available kind of gas should be stated.



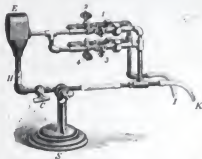
No. 1.

Price, \$5.50.



No. 2.

Price, \$6.00.



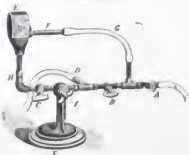
No. 5.

Price, \$10.00.



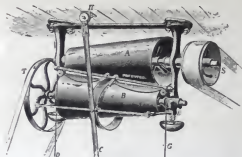
No. 3.

Price, \$7.00.



No. 4.

Price, \$8.00.

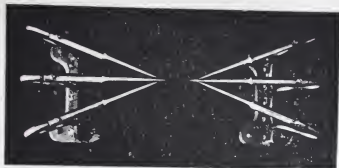


Speed-Regulator for Heating Machines.

WE have adopted the "Evans Friction Cone" countershaft for regulating the speed of all Heating Machines illustrated in this catalogue. It is bolted against the ceiling over the heating machine so that the belt running over the pulley T, and connecting with the "Heating Machine" will run down at an angle of about 45 degrees. Connection with power is made to the pulley S. The regulation of the speed is obtained by moving the belt between the two cones G and B, by the strings or chains G and D, the belt enclosing the cone D forming the contact between the two cones.

The price of this "Friction Cone" varies according to size required, and is usually included in the price of the Heating Machine with which it is furnished.

Weight, packed, about 265 lbs.



Blow Lamps for Electric Light Bulbs.

THE illustration is a **photo-engraving** and represents a "Three Way Fire," used exclusively with **naphtha gas** supplied by our Automatic Oil Gas Machine. This gas is made at a cost of 15 cents per 1,000 cubic feet containing 306,000 heat units, and is the purest and most satisfactory gas that can be used for Glass Blowing.

The cut is an exact reproduction from a photograph and shows the perfect rigidity and undeviating steadiness of the flame, without "beard or flame," and a focus that remains invariably the same, even when exposed to considerable draft. As compared with the best "City gas," less than 5 gallons of naphtha costing 6 cents per gallon are required for the same work, and while this makes it the **Cheapest Gas that can be used**, it has also **proved itself the Best for the Purpose.**

The steadiness of the flame is produced by a positive and unvarying pressure of gas and air properly mixed in exact proportion before it reaches the blow pipes, this pressure exceeding 1 lb. to the square inch. Each blow pipe receives two separate supplies of the mixture, one through a small center tube, and an auxiliary supply surrounding it, ejected through very fine perforations to sustain and increase the size of the central flame with which it combines into one solid and rigid jet of the desired length, thickness and heating power.

Provision is made to suppress the pulsation of the blast and to "quiet" the mixture of gas and air before its discharge into the flame.

The delicacy of the many different heating operations required in the manufacture of Electric Lamps has put our Fuel Gas System to very severe tests, which have been met with credit to ourselves and advantage to our customers, in every instance.

The price of a "Three Way Lamp," as illustrated, is \$10.00 net. "Two Way," "One Way," Hand Blow Pipes, Annealing and Welding Burners to order only.





